JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION

BUS. ADM. LIBRARY

CONTENTS FOR MARCH 1939

Science and Society	R. H. Coats	1
Postponable Purchasing of Durable Consumers' Goods	Charles S. Tippetts	27
Producers' Goods Prices in Expansion and Decline	Lloyd G. Reynolds	32
Prices of Consumers' Goods in Expansion and Recession	Henry B. Arthur	41
Concepts Used in Unemployment Surveys	John N. Webb	49
Discussion	Aryness Joy and Loring Wood	59
Biostatistical Problems in the Standardization of Liquid Household Insecticides	F. L. Campbell, G. W. Snedecor and W. A. Simanton	62
An Index of 10 Commodities, Monthly, 1815-60	Warren F. Hickernell	71
The Effectiveness of Institutional Treatment	George B. Vold	79
The Purpose of Parole Statistics	Harry Willbach	87
Clearing Variates in Confluence Analysis	Horst Menderhausen	93
Notes (See Table of Contents)		106
Proceedings of the One-hundredth Annual Meeting		144
Book Reviews (See Table of Contents)		186

VOLUME 34 NUMBER 205

The Most Widely Used Text in Business Statistics

PRACTICAL BUSINESS STATISTICS

7TH LARGE PRINTING
Latest - June 1938

Contains 136 charts, 86 tables, 57 forms, 27 illus. and 18 maps

By FREDERICK E. CROXTON, Associate Professor of Statistics, Columbia University, and Dudley J. Cowden, Associate Professor of Economics, University of North Carolina.

Now being used in more than 150 colleges and universities, including Cornell, Montana State, Northwestern, Boston, Rutgers, Texas A & M, Ohio State, Colorado, Syracuse, College of William & Mary, Columbia, San Diego State Teachers College, Minnesota, De Paul, California (Berkeley), Utah, Washington, North Carolina, Tulane, Oregon, Missouri, Temple, Pennsylvania State.

Prerequisite: First year high school algebra.

22 Chapters Appendices 529 pp., 6 x 9 in. $3.50 list.

EXERCISES and PROBLEMS IN BUSINESS STATISTICS

By CROXTON & COWDEN

A complete laboratory book, including perforated pages, tabular forms, and graph paper.

In the latest (or fourth) printing of this work, the entire section on Time Series Analysis has been brought up to date. The book may be used with any text in business statistics.

233 pp. (perforated) 9 x 11 in. $1.95 list.
(Answer book available to teachers)

For general courses—

WORKBOOK IN APPLIED GENERAL STATISTICS

BY FREDERICK E. CROXTON

Contains 30 exercises intended to be assigned one a week throughout the academic year. Includes ALL needed forms and graph paper. 233 pp. (perforated) 9 x 11 in. $1.95 list.

TEACHERS: Send today for your examination copy of *Practical Business Statistics* (Croxton & Cowden) and the two workbooks mentioned. This material sent to teachers on 3 months' approval. When writing, please use professional stationery and give official title.

PRENTICE-HALL, Inc., 70 Fifth Ave., New York

JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION

MARCH, 1939 · $1.50 PER COPY · $6.00 PER ANNUM · VOL. 34 · NO. 205

CONTENTS

ARTICLES AND ANNUAL MEETING PAPERS

Science and Society . . . . . R. H. COATS 1
Postponable Purchasing of Durable Consumers' Goods and the Business Cycle . . . . . CHARLES S. TIPPETTS 27
Producers' Goods Prices in Expansion and Decline . . . . . LLOYD G. REYNOLDS 32
Prices of Consumers' Goods in Expansion and Recession . . . . . HENRY B. ARTHUR 41
Concepts Used in Unemployment Surveys . . . . . JOHN N. WEBB 49
Discussion . . . . . ARYNESS JOY AND LORING WOOD 59
Biostatistical Problems Involved in the Standardization of Liquid Household Insecticides F. L. CAMPBELL, G. W. SNEDECOR AND W. A. SIMANTON 62
An Index of 10 Commodities, Monthly, 1815–60 in the New York City Wholesale Markets . . . . . WARREN F. HICKERNELL 71
The Statistical Presentation of the Effectiveness of Institutional Treatment . . . . . GEORGE B. VOLD 79
The Purpose of Parole Statistics . . . . . HARRY WILLBACH 87
Clearing Variates in Confluence Analysis . . HORST MENDERSHAUSEN 93

NOTES

The Natural Decrease of Population in Certain American Communities . . . . . HAROLD F. DORN 106
A Correction . . . . . MILTON FRIEDMAN 109
Note on Punched Card Technique . . . . . C. W. VICKERY 110
Statistical News and Notes
Report of the Central Statistical Board on the Returns Made by the Public to the Federal Government 112
Conference for the Fifth Revision of the International List of Causes of Death . . . . . HALBERT L. DUNN 115
Progress of Work in the Census Bureau . . . CALVERT L. DEDRICK 118
Board of Governors of the Federal Reserve System 119
The Federal Deposit Insurance Corporation 121
Securities and Exchange Commission 121
Federal Trade Commission 122
United States Tariff Commission 122
Farm Credit Administration 123
Bureau of Mines 124
Bureau of Labor Statistics, U. S. Department of Labor 124
Women's Bureau, U. S. Department of Labor 126
Bureau of Research and Statistics, Social Security Board 126
Bureau of Old-Age Insurance, Social Security Board 128
Division of Social Research, Works Progress Administration . . . 129
Division of Statistics and Economic Research, Works Progress Administration 130
Office of Education 131
Graduate School of the Department of Agriculture 131
National Bureau of Economic Research, Inc. 132
National Industrial Conference Board 133
Research Projects at Dun & Bradstreet, Inc. 134
Chapter Activities 136
New Members 141

Continued on next page

PROCEEDINGS OF THE ONE-HUNDREDTH ANNUAL MEETING

Program of the Annual Meeting 144
Minutes of the Annual Business Meeting 153
Reports of Officers, Committees, and Representatives
Board of Directors 155
Secretary 161
Treasurer 162
Auditing Committee 163
Biometrics Section Committee 167
Advisory Committee on the Census 168
Committee on Census Enumeration Areas 171
Committee on Statistics of Delinquents and Criminals 172
Committee on Statistics of Institutions for Mental and Physical Disorders. 172
Joint Committee on Relief Statistics 174
Committee on Labor Statistics 175
Joint Committee on Income Tax Statistics. 176
Social Science Research Council, 1937–38 177
Representative on the Board of Directors of the National Bureau of Economic Research 179
Representatives on the Joint Committee for the Development of Statistical Applications in Engineering and Manufacturing 181
Representative on the Sectional Committee on Standards for Graphic Presentation 181
List of Committees and Representatives for 1938 182

BOOK REVIEWS

Asch, Berta, and Mangus, A. R. *Farmers on Relief and Rehabilitation.* Cleon O. Swayzee 216
Baten, William Dowell. *Elementary Mathematical Statistics.* John O. McDiarmid 209
Beney, M. Ada. *Differentials in Industrial Wages and Hours in the United States.* Theodore A. Veenstra. 221
Blackett, O. W., and Wilson, W. P. *A Method of Isolating Sinusoidal Components in Economic Time Series.* Morton S. Nagelberg . . . 207
Chen, D. T., see Chiao, C. M.
Chiao, C. M., Thompson, Warren S., and Chen, D. T. *An Experiment in the Registration of Vital Statistics in China.* J. J. Spengler 211
Dantwala, M. L. *Marketing of Raw Cotton in India.* A. B. Cox. 228
Deneffe, P. J. *Die Berechnungen über die künftige deutsche Bevölkerungsentwicklung.* John W. Fertig 212
East, Robert A. *Business Enterprise in the American Revolutionary Era.* Max Gideonse 233
Edwards, George W. *The Evolution of Finance Capitalism.* Ivan Wright 194
Einarsen, Johan. *Reinvestment Cycles and Their Manifestation in the Norwegian Shipping Industry.* Carl T. Schmidt 191
Fabricant, Solomon. *Captial Consumption and Adjustment.* Arthur W. Marget 189
Farnham, Rebecca, and Link, Irene. *Effects of the Works Program on Rural Relief.* Cleon O. Swayzee 216
Fisher, R. A., and Yates, F. *Statistical Tables for Biological, Agricultural and Medical Research.* George W. Snedecor 206
Grant, Eugene L. *Principles of Engineering Economy.* B. A. Thresher . 229
Grant, Eugene L. *Principles of Engineering Economy—Problems.* B. A. Thresher 229
Greef, Albert O. *The Commercial Paper House in the United States.* Marcus Nadler 199
Hansen, Alvin H. *Full Recovery or Stagnation?* Fritz Machlup . . . 186
Haven, S. Edson, see Toops, Herbert A.
Havlik, Hubert Frank. *Service Charges in Gas and Electric Rates.* Claude E. Puffer 210
Hubachek, F. B. *Annotations on Small Loan Laws, Based on the Sixth Draft of the Uniform Small Loan Law.* LeBaron R. Foster 201

Continued on next page

BOOK REVIEWS—*Continued*

JACOBY, NEIL H. *Retail Sales Taxation, Relation to Business and Consumers, and Administrative Problems.* James W. Martin 200
KIRSH, BENJAMIN S. *Trade Associations in Law and Business.* Glenn E. McLaughlin 231
LEVEN, MAURICE. *The Income Structure of the United States.* Milton Friedman 224
LEWIS, CLEONA. *America's Stake in International Investments.* James F. Cusick 203
LINK, IRENE, see Farnham, Rebecca.
MANGUS, A. R., see Asch, Berta.
MARGET, ARTHUR W. *The Theory of Prices, A Re-Examination of the Central Problems of Monetary Theory, Volume I.* Melchior Palyi 192
MELVIN, BRUCE L. *Rural Youth on Relief.* Cleon O. Swayzee 216
MOULTON, HAROLD G. *Financial Organization and the Economic System.* Harry Henig 196
NORTH CAROLINA BANKERS ASSOCIATION, RESEARCH COMMITTEE OF. *Trends in North Carolina Banking, 1927–1937.* J. M. Whitsett 197
PRIESTLY, HERBERT INGRAM. *France Overseas, A Study of Modern Imperialism.* E. M. Winslow 204
ROBERTS, CHRISTOPHER. *The Middlesex Canal, 1793–1860.* Vera Shlakman 232
SAUVY, ALFRED. *Essai sur la Conjoncture et la Prévision Économiques.* Robert B. Schwenger 188
SCHMALZ, CARL N. *Operating Results of Department and Specialty Stores in 1937.* Irwin D. Wolf and Lewis M. Silverstein 225
SPENCER, WILLIAM H. *The National Railroad Adjustment Board.* W. Rupert Maclaurin 222
STEWART, BRYCE M. and ASSOCIATES. *Planning and Administration of Unemployment Compensation in the United States.* Burton R. Morley . 218
TAGGART, HERBERT F. *The Cost Principle in Minimum Price Regulation.* Howell A. Inghram 210
THOMAS, DOROTHY SWAINE. *Research Memorandum on Migration Differentials.* Margaret Jarman Hagood 213
THOMPSON, WARREN S., see Chiao, C. M.
TOOPS, HERBERT A., and HAVEN, S. EDSON. *Psychology and the Motorist.* T. W. Forbes 230
VANCE, RUPERT B. *Research Memorandum on Population Redistribution within the United States.* Margaret Jarman Hagood 213
WALKER, MABEL L. *Urban Blight and Slums, Economic and Legal Factors in Their Origin, Reclamation, and Prevention.* Homer Hoyt 215
WHELPTON, P. K. *Needed Population Research.* Margaret Jarman Hagood 213
WILLIAMS, JOHN BURR. *The Theory of Investment Value.* George W. Edwards 195
WILSON, W. P., see Blackett, O. W.
YATES, F., see Fisher, R. A.
YOUNG, JOHN PARKE. *International Trade and Finance.* Edward C. Welsh 202
Publications Received 235

American Statistical Association

Organized November 27, 1839
Incorporated 1841

The American Statistical Association is a scientific and educational organization. Its membership is not confined to professional statisticians but includes economists, business executives, research directors, government officials, university professors, and other persons who are seriously interested in the application of statistical methods to practical problems, in the development of more useful methods, and in the improvement of basic statistical data. Engineers, mathematicians, biologists, actuaries, sociologists, psychologists, and representatives of many other professions are included in the membership of the Association. Information about the Association and membership application forms may be secured from the Secretary, Frederick F. Stephan, 1626 K Street, N.W., Washington, D. C.

The 101st Annual Meeting of the American Statistical Association will be held in Philadelphia, Pennsylvania, December 27 to 30, 1939. With a few exceptions the sessions are open to the public.

Chapters of the Association have been organized in important cities in the United States. Information concerning the meetings of these chapters may be secured from the District Representatives listed on another page.

The Editors welcome the submission of articles and notes for possible publication in the JOURNAL. Manuscripts should be sent to the Editor, Journal of the American Statistical Association, 1626 K Street, N.W., Washington, D. C. Books for review should be sent to the Review Editor, Glenn E. McLaughlin, Bureau of Business Research, University of Pittsburgh, Pittsburgh, Pennsylvania. Authors who wish suggestions about the preparation of manuscripts and charts or information about editorial policies should address their inquiries to the Editor.

Subscription rate, $6.00 per annum. Single numbers of volumes 23 to 32, $1.50 per copy postpaid, except Proceedings Supplements to volumes 23 to 30, $2.00 per copy postpaid. Prices for sets and discounts for orders in quantity available on request.

Published Quarterly by the AMERICAN STATISTICAL ASSOCIATION

Publication Office: 450 Ahnaip Street, Menasha, Wis. Editorial Office: 1626 K Street, N.W., Washington, D.C. Acceptance for mailing at special rate of postage provided for in the Act of February 28, 1925, embodied in paragraph 4, section 538, P. L. & R., authorized March 25, 1936. Entered as second class matter at the post office at Menasha, Wisconsin.

JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION

Number 205 MARCH, 1939 *Volume 34*

SCIENCE AND SOCIETY*

By R. H. Coats
Dominion Statistician, Canada

"Difficult, ye mean, Geordie, not impossible," replied the King; "for that whilk is impossible is either naturally so or morally so; but what is only difficult may come to pass, with assistance of wisdom and patience."

—*The Fortunes of Nigel*

I

Proem

Canada is the Scotland of America, and a proof is before you. Scotland gave a King to England in 1603; to-day Canada gives a President to the American Statistical Association. James Sixth of Scotland and First of England whose vasty shoes I thus inherit is, I fear, "mixed grill" to many. He was an apriorist, and he was a pedant. Though his education was bleak and early as Stuart Mill's, he hadn't a good style. His personal appearance was against him, also his northern accent, even his table manners (he drank his cocky-leekie from the bowl). He was given to cursing and swearing. It is a chilling historicism. Yet, despite that Professor Laski still uses him austerely in the *Encyclopaedia of the Social Sciences*, from a boy with the *Fortunes of Nigel* in my school-desk I have liked its "principal personage" (as Scott called him) James. And of course he is the James of Jamestown, first permanent English settlement, first cradle of representative government, in these United States.

Speaking of Nigel, even in the 'nineties we used to skip the antique, Dr. Dryasdust "Introduction." Yet there amidst a descant on dying chivalry stands out a sentence how that when Nigel went up to London "already the hour was arrived when Bacon was to teach the world no longer to reason from authority to fact, but to establish truth from fact to fact." It appears my cue. And James who was a theologian in the seventeenth century, would they say have been a philosopher in the eighteenth, a man of science (of Tennyson's water no doubt) in the nineteenth, and I like to hope a statistical "fan" (useful word) to-day.

* Presidential address at the One-hundredth Annual Meeting of the American Statistical Association, Detroit, December 28, 1938.

He "enlarged" and protected, though he did not comprehend, the *in*-ductive Bacon; if Bacon fell it was because of his *de*ductions (the pun, alas, is pure James).

My title is "Science and Society," one must be in the fashion. Incontinently I call the Social Sciences "Science," though the "exact" sciences have been stretching a hand of late upon us. Overseas, Lancelot Hogben, Julian Huxley, J. B. S. Haldane, are indeed "the cat amongst the pigeons."[1] Here, judging by our A.A.A.S., they would not "take over," but they do insist on "social" status. Perhaps they have been reading Walter Lippmann who judges with President Butler that joint-stockism, a purely social device, did as much as invention to increase production in the nineteenth century,[2] at any rate it can buy up the patents. And History is aware of inventions before 1800, *vixere fortes ante Agamemnona*.[3] And the anthropologists (statisticians now, by whose measurements the Indian, the Negro and the Eskimo are the "highbrows" of the continent)[4] would say that it was the stirrup that made Attila a nuisance long before poison gas and the fire bomb, our own fine flowers.[5] But in truth there is nothing in history like the problem of today. Moreover, it grows. Chemistry alone with its *catalyst* and now its *valence* with quantum theory taking on the energy problem—the sun-and-earth machine, the geo-electric engine, a utilizable sub-atomic potential—perhaps! As to our biological future, it isn't decent; its *Brave New World* makes Dean Inge sick in the English use. Astronomy and four-dimensional physics meanwhile poise us between ∞ and δx (10^{27} atoms = 1 man; 10^{28} men = 1 star) in mere awe; and mass is energy and energy is mass, and so on:

This is a snow flake that was once a flame.

We are like Alice when she nibbled the mushroom and her chin got

[1] "The association of economics with science jars harshly on the modern ear" *Prolegomena to Political Arithmetic*, by Lancelot Hogben.

[2] *The Good Society*, by Walter Lippmann, pp. 13–17.

[3] "Spice high with Latin and a curn or two of Greek," one was admonished when conversing with James; of Hebrew he was less exigent. The Marquis of Worcester's list of one hundred new inventions (all his own) appeared in 1663; Hero of Alexandria's about 75 A.D.,—from a fire engine to a penny-in-the-slot machine.

[4] And you are not weak because your chin recedes or brave because your jaw sticks out. (*The Forehead*, by A. Hrdlička). Pearson's controversy with the craniologists may be recalled. (*Biometrika*, Vol. II). Statistics is giving meaning to the new science of biotypology.

[5] The stirrup enabled cavalry to thrust as well as deliver chopping blows. But the fire-bomb has the "edge," especially on non-combattants, as Bruno Mussolini's *Volli Sulle Ambe*, (recommended to Italian schools) elucidates:

> "I got only mediocre effects because I was expecting enormous explosions whereas the little Abyssinian homes give no satisfaction to anyone bombing them. The incendiary bombs give satisfaction, at any rate one sees the fire. We set fire to the wooded hills and the little villages; it was all most diverting: I began throwing bombs by hand. It was most amusing. A big "zariba" was not easy to hit. I had to aim carefully. The wretches inside, seeing their roof burning, jumped out and ran like mad."

tangled with her toes. Not that the social sciences could advance till physics and chemistry had defined the environment, and biology and psychology had told us what we are—statistics were not very necessary before 1700. But now, as I say, the cry is for help, the need is dire. Man must not wear his science like the shirt of Nessus.[6] But in the vernacular, is he who heaves the brick the one to assess the damage, noble as it is to offer? And is the "balm" to be the "Cartesian Economics" of the Chemists?—or the Technocracy or the Social Credit of the Engineers? Ah no, the tail must not wag the dog, even "a ninety-six inch tail on a four-inch dog." In the new Salvation Army the social sciences must take over and direct the natural sciences, not *vice versa*—of course, like General Booth, not letting the devil monopolize the good tunes. This is all the natural sciences want—to tell us how. My point is that, so far, they lack definiteness in the telling. And here without further "build-up" my title regresses to "Statistics and Science," not that the change is so great. In close upon the 100th year of our Association and of the *Physique Sociale* and of Cournot's *Recherches;* about the 200th of the *Treatise of Human Nature;* one is almost compelled to the pleasant theme. James himself could have wished no wider for his discursive tongue.

One other apologetic: A preacher (Scottish) once explained that when he said religion he meant the Protestant religion, and by the Protestant religion the Presbyterian religion, and by Presbyterianism the Wee Free Kirk. So I in like-felt *crescendo* address you only as a statistical administrator, but that of a central Statistical Bureau, a ministry as it were of all the talents. James, who wrote thirty books on forty subjects (from predestination to tobacco), was an administrator when Kings were Kings; an office like mine which has many times James's output (and on more subjects), is of a day when Statisticians are fast becoming Statisticians. If therefore I speak in all the bravura of the *Basilikon Doron*, you will understand.

II

Statistics and "Science"

Beginning softly, statistics has long been handmaid to these exact sciences, apprenticed in the scullery, but now risen housekeeper, *eating with the family*. Statistical averages and distributions now supplement the old inductive processes everywhere, i.e., the observing of experimentation has become scientific. This opens a dozen vistas. Passing

[6] Or, as W. F. Ogburn would say less tragically, the tin can, marvel though it be, must not be tied to Society, even in the form of women's suffrage. "The invention of the tin can led to canning factories; it reduced the time in preparing meals; it thus gave women more time for activities outside the home." *The Influence of Invention and Discovery*, by W. F. Ogburn in *Recent Social Trends*, Vol. 1, Chap. III.

astronomy the pioneer (our motion through space only an index number); passing biology the preëminent (species only a statistical grouping); let us glance down just the two most distractingly intimate to *homo sapiens*,—the two he places first in the prayer book, preceding economics: medicine and psychology.[7]

Medicine.—Medicine, a fragment of Greek science, all but perished when slave labour divorced the manual from the mental, leaving diet to nurses, *materia medica* to monks and apothecaries, surgery to barbers. The Renaissance set that straight,[8] and Vital Statistics for a hundred years has been signalling just where to train the guns—a reconnaissance on foot at first, now the scouting airplane. Dublin and Lotka think modern medicine will add, say, another ten years to life.[9] But though this still leaves "Back to Methuselah" to biology and Bernard Shaw, did you notice the fuss over the new fertility questions in England lately, and the indignation of Mr. A. P. Herbert, M.P., that women should be thought of like "cattle?" Mr. Herbert is a humourist (at any rate he is an editor of *Punch*) and still looks for children under gooseberry bushes, or for embryology in Ecclesiastes (xi, 5).[10] But the doctor of 1938 is being taught more than birth, death and morbidity reports, or how in the laboratory to correlate the elusive bacteriophage, —he is being taught how to capitalize his experience. Startling is Mr. Bradford Hill's hint of what may happen from an unscientifically analyzed hospital record, and how easily a doctor may fool himself (and you and me) on what are quaintly called his "survival after treatment" rates.[11] One would say again that individual diagnosis for malnutrition in school children would be superior to objective mass tests based on physical and physiological measurements, but it appears not: the insufficiency of the clinician's judgment in many a field could have no better demonstration.[12] The public is sensing this. Preventive medicine will soon include preventive statistics, and doctors will apply therapy in the light of σ and χ^2.

Psychology.—Bound though it remain to the old Cartesian duality, the psychology that has shaken our time is objective. Energies, instincts, libidos, complexes, mostly of that new induction the unconscious mind, are the interest; urgency the yardstick; "measure and

[7] "All those who are any ways afflicted or distressed in mind, body or estate."

[8] For a striking image see *Social Judgment*, by Graham Wallas, p. 122.

[9] *Population* for Feb., 1934; also *Twenty-five Years of Health Progress*, Chap. III.

[10] Recalling the classic speech by one Thornhill in the British House of Commons in 1753 when a Census was proposed over the head of King David's experience: "I did not believe that there was any set of men or indeed any individual of the human species so presumptuous or so abandoned as to make the proposal which we have just heard." *Dictionary of Political Economy*, art. *Census*.

[11] *Principles of Medical Statistics*, by A. Bradford Hill.

[12] *Physical indices and clinical assessments of the nutrition of school children*, by R. H. Jones, *Jour. Roy. Stat. Soc.*, Vol. CI, Part 1.

move forward" the slogan. Quantitative goes hand in hand with qualitative even in accounting for cognition.[13] "The problem of judgment" (the harmony of reason and emotion), says Graham Wallas, "is quantitative." The intelligence test (G, with growing additions) bogged down till statistics replaced diagnostic (incidentally making hard going for the felicific calculus?)[14] Galton's correlational coefficients theorem has expanded into the multiple factor analysis of temperamental and character traits, for better "captaincy of the soul." (Psychoanalysis might have made a man of James.) And finally there are the para-psychologists. We have all been playing Professor Rhine's new card game—the extra-sensory perception (telepathy, clairvoyance) game.[15] It appears that Professor Coover, endowed to assess Psychical Research and assessing it nil, slipped up in his statistics. The Duke experiments took off by creating the phenomena, thence statistically. Sad to say they grow less exciting. But will this new sheep ever win to the psychological fold? Did the Woman of Endor really raise Samuel? or have she and Saul and later compeers of the Poltergeist been merely raising Cain? Statistics is having a lot to say about it—from the stage, not the coulisses.

Background—This Statistical Universe.—And, hark, what strain is this from the circumambient ether, wherein, as Eddington whispers, "something unknown is doing we don't know what!"[16] The second law of thermodynamics is just sampling and averaging; we can visualize its contradiction, as by Maxwell's demon. Thus entropy, the alpha and omega, whereby the cosmos will surely one day reach thermodynamical equilibrium, and the present once and for all catch up with the future, and the forecaster cease from troubling (in a Nirvana of commingled history and geography)[17]—entropy is just "proportional to the logarithm of the probability of the universe."[18] That may not matter for those of us who have things to do first (we have a thousand billion years to go), and in the space-time continuum

[13] *Psychology down the Ages*, by C. Spearman, Part E, wherein certain mental unities are derived by a statistical technique from (a) three knowledge-originating principles of a qualitative kind, stated as tendential, and (b) five quantitative principles, which determine their occurrence and amount. Contrast Joad's "psychology only becomes scientific at the cost of turning into physiology . . . Psycho-analysis substitutes the stirring of the bowels for the process of reason." (*Return to Philosophy.*)

[14] As a measure of the importance of the statistical use of applied psychology, Cattell finds that "the birthrate is inversely related to the intelligence level, *throughout the whole of intelligence.*" If matters continue as at present "in 300 years half the population (of England) will be mentally defective." (*The Fight for our National Intelligence.*) In Sweden, however, the outlook is less alarming (*Studies of Differential Fertility in Sweden*, by Edin and Hutchinson).

[15] *New Frontiers of the Mind*, by J. B. Rhine.

[16] *The Nature of the Physical World*, by Sir Arthur Eddington, Chap. XIV.

[17] In the meantime, however, the future here is as "existent" as the past, though there is no "now" in space.

[18] "A definition which no statesman would be unwilling to admit to lie completely outside his purview." *An Introduction to the Theory of Statistics*, by G. Udny Yule.

Since there's no help, come, let us kiss and part

will tell the *hysterica passio* of lovers for that long, but statistics sets the ineluctable end. And, again, since Heisenberg, there is no cast-iron determinism in physics (there never was, says Dingle) only statistical laws; the electron is just "a smear of probability"—a holistic Arminian as it were; and the quantum physicists' art is the art of the bookmaker. We cannot define and confine the human unit? Well, neither can the physicist the electron, which is both velocity and position—a series of discrete happenings (teleologically or causally inspired let them fight it out) impossible even to imagine connectedly. Matter is but a mathematic of events: where numbers are large chance is the warranty. Physics and biology are not "simpler" than sociology, they are only "bigger," i.e., have larger aggregates to work on. Thus speaketh a new Zarathustra.[19]

III

Aristotle and Galileo in Practical Politics

And now, Mr. Chairman, I approach the Social Sciences, where, if this were an epic, I should make *ad hoc* invocation of the Muse (Urania in our case as in Milton's) "to the hight of this great argument," while it pursues not only *la statistique* but *les statistiques*, a Brahma indeed.

Statistics are primarily for "executive" use, to do things with—which weds us at a word to "applied science." But frankly I was also brought up *Consule Planco* to think that statistics were parade-ground for theory, that statistics and theory were like Huz and Buz of whom Genesis (xxii, 21) makes the cheery remark that Huz was the brother of Buz, and leaves it at that. But notoriously no poor relation expects to be made much of. And greatly though we be risen in the world today, let us still beware of *nouveau riche* pretentions. But let me bandy words for just one moment, at safe distance—James had "a genius for raising dangerous questions and settling none."

Professor Hayek comes close to the cut direct. Man, to Professor Hayek, hangs midway between nature and society, the effect of one, the cause of the other. In nature the essential facts can only be surmised, but in society they are part of the stuff of our thinking, "known beyond the possibility of dispute." In the Natural Sciences, therefore, the empirical lies in the elements, whereas in the social sciences it is in the inductive process. Statistics cannot verify; they can, however, pose new problems. Naturally, in the Hayek epistemology (not to say solipsism) statistical technique sings low. Even so might Walter Lipp-

[19] But see *On Understanding Physics* by W. H. Watson, particularly Chap. III; also Schrodinger's *Science and the Human Temperament.*

mann, nonplussed as to what he would like for breakfast, reflect how many million times harder it would be to order breakfast for the United States.[20]

And Lionel Robbins has a fling at quantitative economics for never having discovered a law (Bonar advises "law" in quotation marks). But if it was economic legalisms that ruined Spain, lost the thirteen colonies, retarded factory legislation and set up a wages fund, (resembling Providence at least in being consistently on the side of the big battalions) Robbins himself would call it a day with us when fact leads on to larger fact, as for example when Kuznets on capital formation improves on previous analysis.[21] So Cassel in the midst of his *Quantitative Thinking*, when he falls upon Professor Douglas's demonstration of the classic method of (1) the hypothesis; (2) the equation; (3) the verification by statistics (unfortunately Douglas failed to verify the famous three per cent); would still agree with the much-quoted "mathematics is a subject where we do not know what we are talking about or whether what we are saying is true." of Bertrand Russell.[22] Of course statistics is accustomed to gloatings over her frailties; some even transfer their own "illusions" to her, as if the moon were to blame when Burns saw too many horns.[23]

Now Burns poses the problem. Surely our bane is that the things "known beyond the possibility of dispute" have a way of turning out not so. Looking at the moon, Burns counted. He counted wrong, as a statistician in Burns's condition will, but his method was right. It may be only a trick of the brain that the one thing it can grasp comfortably is quantity, that until we measure a phenomenon we do not

[20] *Collectivist Economic Planning*, by F. A. von Hayek; *Economics and Knowledge* in *Economica* for February, 1937; *Is the Trade Cycle a Myth?* by E. C. Snow in *Jour. Roy. Stat. Soc.*, 1938. Lippmann's *The Good Society* consistently understates quantitative possibilities. H. J. Fleur thinks Society is the Creator of man, not *vice versa!* (*Huxley Memorial Lecture*, 1937).

[21] *Nature and Significance of Economic Science*, by Lionel Robbins; *Philosophy and Political Economy*, by James Bonar; *Social Judgment*, by Graham Wallas, pp. 120–127; *National Income and Capital Formation*, 1919–1935, by Simon Kuznets, 1937.

[22] *Mysticism and Logic*, by Bertrand Russell; *Professor Cassel on the Statistical Determination of Marginal Productivity*, by Paul H. Douglas, in the *Canadian Journal of Economics and Political Science* for February, 1938. Theories, says W. H. Watson (*On Understanding Physics*), "must in the first place do what a crude map does for a surveyor . . . the equation is the perfectly clear as opposed to the muddled statement . . . but a clear statement may still be incorrect." The year's monumental essay in verification is the lamented Schultz's *Theory and Measurement of Demand*.

[23] Professor Knight, e.g., is scandalized at discrepancies of 40 per cent in cotton estimates, but not at theories which are diametrically or 100 per cent opposed to each other. (In *The Trend of Economics*.) The particular Burns incident is in *Death and Doctor Hornbrook:*

"The rising moon began to glow'r
The distant Cunnock hills out-owre:
To count her horns, wi' a' my pow'r,
I set mysel;
But whether she had three or four,
I cou'd na tell."

know it, but it is the trick that has given us Science, or the mathematical description of things, based of course on the faith that things yield to such description. Yet for thousands of years "men thought it foolish to use their eyes on what their minds told them so clearly," and Aristotle (in the old story) promulgated that heavy objects fall faster than light, till Galileo dropped a mixed lot off the Pisa tower—and they went down *aequo pede*.[24] The matter, however, is different when Burns (even a sober Burns) is looking not at the moon (perceptually) but at his fellow men and himself (conceptually)—for a new subjective emerges, and the social sciences are enmeshed. Well, but society is not an individual but millions of individuals, and millions do "stay put." Analogy may mean much or nothing, as Mill says, and it may be little practical that the sciences are steadily converging upon one another and tautologically upon the flower in the crannied wall, but the new physics is more than titillating. The physicists seem, if from another planet one may say it, like M. Jourdain when he discovered that he had been talking prose all his life: they have discovered that the physical universe is not "hard" but "fuzzy"—like the social universe.[25] But if this gives a new status to probability, it must not and does not abate the extreme of deterministic care over the observed foundations. In the war that comes down every wind between the "Aristotelians" (misnomer rather hard on Aristotle) and the "Galileans" over the "cosmolatries" of Milne, Eddington and the rest (an aftermath of relativity), the Aristotelians would shift from prose to poetry, from physics to metaphysics, where we may all land at last if we are interested in what things *are* rather than in what things *do*. (Back to Hume, who abolished causation! back to Berkeley, who abolished matter!)[26] But statistics has the best of both these worlds, its detail (*les statistiques*) the

[24] Aristotle similarly said that air had no weight, and man went seventeen centuries without the common pump. Aristotle made few observations himself, and had a very limited range of facts from which to generalize. "His was a philosophical age. But he clearly understood the objectives of scientific method and research. His followers listen to him saying 'Let us first understand the facts and then we may seek their causes.' Again, 'We must not accept a general principle from logic only, but must prove its application to each fact, for it is in facts what we must seek general principles, and these must always accord with the facts'." R. E. Chaddock in *Am. Stat. Jour.* for June, 1930. The elimination of the observer is only technique.

[25] "In the live branches of physics formal logic is not called for; what is needed in a very different kind of thinking, a review of a system of interrelated facts and a perception of conjectured analogies." *Logic and Probability in Physics*, Presidential Address by Professor C. G. Darwin, Section A, B.A.A.S., 1938.

[26] Milne "by metaphysics out of mathematics" can breed universes at will, whilst Eddington is equally fertile with our own. Over against, Dingle cares no more for Milne's universes than for Alice's; Jeans's mysterious universe, says Dingle, isn't mysterious: Jeans and Eddington but emotionalize the new mathematics from a tool and fifth sense into a science self-contained. Eddington, however, can derive N, which now replaces infinity as the number of particles in the universe, by sheer knowledge of relativistic quantum analysis: by looking at the articles in a house, says Eddington, we reach the generalization that none cost more than sixpence, but we can reach it equally well by knowing that they were bought at Woolworth's. (*Nature* for May 8 and July 12, 1937, for the apotheosis of the Dingle-Eddington controversy.) The Aristotelians are attracting endowments, which is bitter.

very stuff of Empiric, its mass (*la statistique*) the dread kismet of Law. Of course the nearest analogue to economics in Science, since Marshall will have it so, is biology. Marshall rather fobbed off Mendel, and one wonders what he would say of Needham's statistical biology and the continuity of inorganic, biological and social order.[27] There has always been overlapping too in the old opposition of experiment and observation as method. Astronomy and meteorology among the natural sciences do without experiment: we can predict eclipses, but weather not so well, so we call Nikias a fool, but still pray for rain. But how dangerous to say any longer that the social sciences cannot experiment: not only that but the experimentee can talk back while the experiment is on—what no cell or atom can do. In the threnody of C. F. Roos for the N.R.A., the loudest note is over the current statistical controls that might have been.[28]

To return to qualitative personalities: "Cloistered," "physiology not pathology," "too easy" as a brain exerciser, "unromantic," are words in Pigou's "apologia" for economics (Pantaleone's "an idle science though a true one"—almost James Mill's "contemplative pleasure").[29] Yet, though he would not "trespass" on ends, ("what drugs will do, not what drugs to take"), he believes there should be "economic practitioners," to tackle "immediate practical problems."[30] Keynes thinks economists should go on Government committees. So say all of us, if they will bear yet another Pigou injunction in mind: "to clothe the dry bones of theory with appropriate statistics" (there being an appropriate boneyard no doubt when the clothes will not go on). And I make bold to believe that a poll of "economic practitioners" will find four out of five practicing just this device—statistics. On this I make the observation that ordinary training in economics is not training for research: it sounds incredible, but there are exhibits from time to time by economists, welcomed "with whoops" as Mr. Mencken would say by others, which are just bad statistical work—at least I know it may be so in Denmark. *Bien entendu* economists should not be adding to Mr. Cohen's star-ypointing pyramid; Einstein may never touch an instrument, but he does not take on laboratory jobs.[31]

[27] "The biology of tomorrow will be statistical . . . . One solitary isolated phenomenon is of no more interest to the biologist than the man in the moon . . . it is not until we begin to deal with whole populations of facts that regularities begin to appear." (J. H. Needham in *Science Today and Tomorrow.*) And again: "Living things differ from dead things in degree and not in kind, and are as it were *extrapolations* from the inorganic." (*The Sceptical Biologist.*) Cf. also *Science and Common Sense* by J. Langgon-Davies, Chap. VII. Most daring as analogy is Reiser's suggestion from relativistic kinematics that the structure of thought may be inferred from the structure of light, based on the Morley-Michelson speed of light as an absolute.

[28] *Economics in Practice*, by A. Pigou.

[29] *N. R. A. Economic Planning*, by C. F. Roos.

[30] Though "problems" suggest pathology: doctors are for indigestion, not just digestion.

[31] *The Misuse of Statistics*, by J. B. Cohen (*Am. Stat. Jour.*, Dec. 1938).

I fear my distinguished colleagues of the platform like Queen Victoria "are not amused," so I repeat that I speak only as a government statistician behind the chair as it were of Dionysius, whom James by the way took for model but who is better known for giving Plato the sack, *pour encourager les autres* to this day.[32] *Our* job is to assist the largest of executives on specific, usually pressing, problems—of administration, of social policy—just the field in which Society is falling down, says Science. Of course we should like to be as Huz and Buz with theory, and impossible as it sounds in these days of specialization I believe most government statisticians could say of theory as Josiah Allen of *Paradise Lost* that if they have not read it all they have "hefted" it. Part of the reward (one has to say it) is the dazzling controversy, sometimes all along the line—foot, horse and artillery—as with Barbara Wootton last summer. But unless called to give evidence, the statistician can but murmur to this, either "how can Satan cast out Satan," or contemporaneously with Bertrand Russell "thought alone cannot establish any non-verbal fact." If a law is general enough it cannot help being right, but of what use is it to governments who cannot summon help from *ceteris paribus* or wait upon the "long run," for the *ceteri* are human beings all with votes—it is majorities not modals that matter. By a categorical imperative government economics is empirical. All of which leads to the one point in this paper, adumbrated when I said that the scientists in springing to the help of the economists are not practically minded. Notwithstanding the advances of the past decades, notwithstanding that we have certain materials to suffocation, the problem remains the *how* of things, as when Newton never made a theory till the facts required it (*non hypotheses fingo*). Pigou is right: economics is not so hard, if only we could know what we are talking about. I shall expand on the latter in a moment. But first may I exemplify? I choose two subjects, unemployment and population, for their topicality, and I use Canadian statistics, not I hope another of the bores whose geese are swans, but simply as proffering chips from the workshop I know.

IV

Empiricist at Large

Unemployment.—To the orthodox, unemployment is "disequilibrium." It wouldn't happen in a free market, except transitionally. When it does—reduce wages, restore production and thus take up the slack, quietistically. Relief is another rigidity. *Per contra,* Mr. Keynes tracks

[32] "This Dionysius, whom I took for my pattern, the rather that he was a great linguist and grammarian and taught a school with good applause after his abdication (either he or his successor of the same name, it matters not whilk)"—*Nigel* (James *loquitur*).

unemployment past cyclical maladjustment to its lair in unemployed resources, unwillingly unemployed because savings are not flowing into investment. For cure,—reduce the rate of interest, which is not the reward of abstinence but a premium on not-hoarding swayed by liquidity preference, savings being a by-product of the level of income. Orthodoxy invokes scarce means; Mr. Keynes would prime the pump, after the philosophy of Mr. Alfred Doolittle.[33] Pardon this unseemly brevity in so many-volumed a matter.

No doubt more and better "barometrics" would help in this, diminishing too that strain upon intuitive banking of which President Burgess spoke with pathos a year ago, that trouble in distinguishing cheap from easy money, new capital equipment from replacements—in generally maintaining the "feel" of things.[34] What finally is this cycle, not always of contrasting but often of similar interrelations of factors on the way up and on the way down; whose path is more the strayed reveller's than the pendulum's;[35] which shows signs of stepping out of the picture altogether—Stamp indeed says it will vanish once we define it, like a "complex," or one of Stuart Chase's "referents." The League of Nations is promising a world look-out, statistical one hopes, and has already got from Professor Haberler a synthetic framework of theory.[36] But to-night I approach from the other end, that of the unemployed themselves, who though ignorant of seismology know how the earthquake hit them. I invoke, as before said, the Canadian scene.[37] We overturned a government in Canada in 1930 and held a special

[33] Keynes makes the assumption that the more income people receive, the larger proportion they save, whereas the classical economists assume that savings will be much less flexible, as human wants are unlimited. Both of these statements, of opposite bearing on policy, are without verification, though a family budget study over the gamut of incomes would clarify the point. Miss Gilboy (*Quar. Jour. Ec.*, Nov., 1938) seems to say that for large classes of the population, Keynes's postulates are not so.

[34] "Business forecasting," it has been said, "must be by observation not by theory, and in observation we must not be hypnotized by our tools, but must get the feel of the phenomena themselves. The business trend is full of all sorts of whirls and eddies that change as the stream strikes new channels, often working in diverse directions."

[35] *Economic Theory and Unemployment*, by Frank D. Graham in *Economic Essays in Honour of Gustav Cassel*, 1933. In the same volume Carl Snyder's *Measurement vs. Theory in Economics*, and his *Business Cycles and Business Measurements*, 1927. The mocker is abroad as ever, as for example *Critic* in the *New Statesman*, June 18, 1938:

> "News from the economic front. According to one school of thought we are now experiencing a major intermediate recession in a major cyclical recovery, but this view is opposed by those who argue that it is a minor intermediate recession in a major cyclical recovery. More pessimistic are the people who dispute whether it is a major or a minor intermediate recession in a minor cyclical recovery, and these who plump for a minor intermediate recession in a minor cyclical depression are outbid by whose who insist that it is a major intermediate recession in a minor cyclical depression. The realists ask us to face the fact that it is a minor intermediate recession in a major cyclical depression and the Cassandras go all out for a major intermediate recession in a major cyclical depression. The truth can probably be summed up in Calvin Coolidge's dictum that when a large number of people are out of work a state of unemployment can be said to exist."

[36] *Prosperity and Depression*, by G. von Haberler (League of Nations). Of course, it does not satisfy all economists: e.g., R. F. Kahn, in *The Economic Journal* for Dec. 1937.

[37] *Seventh Census of Canada, Vol. VII;* also Census Monograph on Unemployment.

session of our Parliament; enacted then and thereafter a long series of relief measures; turned out another government; and finally set up an Employment Commission; in all of which Unemployment was Public Enemy No. 1.

It still surprises some that in our 1931 Census we found nearly as much wage-earning employment in Canada, *per capita* of population, as in 1921 when we had no such disturbance. There was vastly more unemployment among persons working for wages, but why? Because there were proportionally more wage-earners. Because in the interval, while population increased only 18 per cent, and the total gainfully occupied only 20 per cent, the number of wage-earners increased 30 per cent. Under "prosperity" the wage-earners curve had siphoned a great "hump" out of the curve of workers-on-own-account. When the boom broke this was projected as unemployment: the boom-made jobs were gone, the individual had cut the painter with his old status.[38]

A second element can be isolated quite handily: Industry as it becomes mechanized, rationalized, integrated, centralized, increasingly constricts its labour supply; the rejects tend to become casual. This is secular, not cyclical, i.e., it is not a durable vs. consumption goods phenomenon.

Moreover, unemployment is not a matter of all or the majority of workers being sometimes employed and sometimes idle, but of a differentiation (which is hardening) into two classes, the one seldom employed, the other seldom unemployed.[39] The unemployed thus appear, first a sort of human scaffolding cast aside when the building stage of enterprise is over; secondly, a series of discards made as operating requirements are worked out.

Some 1931 and 1936 figures are interesting. In 1936 certain industries showed an increase in numbers at work, whilst others showed a decrease, the increases aggregating 31,000, the decreases 24,000. You would expect less unemployment in the first category, but there was not, the reason being that, though the number at work increased, the total number of wage-earners increased *pari passu*. Meanwhile the industries that had 24,000 fewer jobs had actually fewer unemployed, because 30,000 workers got out of them, and this was not to any great extent a transfer to the increasing industries.[40] How important is the

[38] The Canadian Census, it will be noted, breaks up the total "gainfully occupied" population into (a) "wage-earners," and (b) "workers on own account."

[39] The differentiation varies with industry; it is much greater in an industry in which a small proportion lose time than in one in which a high proportion report some loss of time—the degree of difference appears to be a function of time lost, a fact of direct bearing on relief policy.

[40] The 1936 Census from which these figures are taken covered only the three Prairie Provinces. The complete figures are as follows: While the total number of "gainfully occupied" increased from 895,786 in 1931 to 915,436 in 1936, or by 19,650, the number of "workers on own account" increased by 32,891, so that the number of "wage-earners" decreased by 13,241. Meanwhile the number of unemployed wage-earners decreased by 18,739.

distribution factor is seen of course if we project the 1921–31 trend: it would require, by 1941, an increase of 26 per cent in volume to maintain even the 1931 proportion of continuously employed, yet at that the number losing time would be swelled by 50 per cent.

What of wages and earnings? It is the low-wage class that shows heaviest unemployment. Indeed, it would seem that the higher the wages the steadier the employment. Less than a half of our wage-earners receive perhaps 80 per cent of the wages bill; had all our unemployed worked full time in 1931 it would have added less than 15 per cent to that bill. Could they have been put to work by wage-reductions in the higher brackets? Well, if we cut the wages of, say, statisticians, (which Heaven forfend), we might theoretically hire more and increase output, but we could not hire from amongst the unemployed because there are no unemployed statisticians in Canada, and no statisticians employed at other than statistical jobs. Alas, there are too few altogether.

Race and sex have little bearing. There is unemployment amongst the races attracted by the boom conditions, but that is not "race." Female workers fare as badly as the males *ceteris paribus*, except as regards long-time unemployment: as a class they are in occupations less exposed to unemployment. As to age, the old and the young are not more apt to lose their jobs, as is commonly said, but it is harder for them to obtain new ones.[41] Seasonality is not the bugbear it is sometimes painted.

I review these facts because it has been said that "quantities of employment can be made strictly homogeneous" (Keynes fabricates a "labour unit" playmate to the "economic man"); and again that high prices of raw materials counteract high industrial wages as labour magnets during a boom. Distance no doubt lends homogeneity to the view, but those who must provide relief, preserve occupational skill and maintain morale in a country, cannot use the big end of the telescope. There is all the difference in the world between the entire working force losing a couple of weeks a year, and 5 per cent of it losing the whole year. Yet in many an *aperçu* this disappears, as from an airplane disappear those earth-wrinkles so distressful to road builders, excellently as earth-sphericity is revealed. Suggested remedies are also general: the well-being of the body, it is presumed, is the well-being of the cell. But if low interest does not distribute as well as create demand for a unit of labour per unit of production, it will not eradicate

[41] *A propos*, Beveridge commenting on the common view that men become too old at 55 or 60 years to be retained in employment, points out that old union records run directly counter to this view. "In them at least men seem able to work on to a later age than they could a generation ago." Commenting, however, on the special Report on Unemployment by the U.K. Ministry of Labour in 1927, he arrives at the same conclusion as above.

unemployment.[42] "How unsuitable" says Beveridge, summing up a masterly analysis of the British insurance figures, "is unemployment for abstract theorizing in general terms. . . . The beginning of an understanding of the unemployment problem is to break it up," and he goes on to suggest improved organization of the labour market.[43] Now figures like these are not the whole story, and it is their proportional effect which counts.[44] But neither can advice be "lifted" out of macroscopic cycle theory—dosing the patient without looking at him. So we may repeat our Canadian Census of Unemployment in 1941, (if we could extend it to capital and income a real *critique* could be written), unless of course the world equilibrates its equilibrium in the meantime; at present, equilibration is proceeding *via* measures to exterminate the species.[45]

Housing.—A footnote on housing, the supply of which is more responsive to variations in income than in building costs, as the trade cycle knows. Less known is it that the rate of increase of number of rooms per person at progressive earnings levels tends to be highest in the middle earnings groups, while the ratio of rent to earnings actually increases for a brief interval in the lower groups. In other words, a simple statement of Engel's law requires qualification as a description of housing expenditure. Such at any rate emerges from certain Canadian Census analyses,[46] which are also suggestive of how the equating of crowding and the evaluation of the low rent problem may be approached. They make two points abundantly clear: First, sampling surveys, of which we have so many nowadays, are intelligible and safe for generalization only if based upon census "controls" made possible by cross-classification of earnings, rent, size of household, number of rooms per household, etc.; secondly, there is a basic relationship between income and the adequacy of housing. Yet the League of Nations is sponsoring a World Housing Census which leaves income out of the picture—are sociologists interested?

[42] Incidentally it is not to be assumed that spreading jobs on the part-time principle does nothing to increase aggregate purchasing power and thus up-turn the cycle; it probably does.—*Short Period variation in the distribution of incomes*, by Hans Staehle, in the *Review of Economic Statistics for August 1937 and August 1938.*

[43] *Economica*, November, 1936, and May, 1937.—also his *Unemployment a Problem of Industry.* The Archbishop of York's Committee points the same moral. (*Men without Work:* a Report made to the Pilgrim Trust.) Certain of Beveridge's *a priori* statements require qualification for Canada, e.g., an increased demand for labour will not produce insufficiency of supply and a rise in wages as readily as in Great Britain, owing to our larger reserve of potential wage-earners.

[44] The law of gravitation is not that bodies attract each other, but that the attraction is proportional to the product of their mass divided by the square of their distance. But the distribution factor in employment has been overlooked and is certainly of first importance.

[45] Expenditures of 60 nations on armaments, have increased from $3.8 billions in 1932 to $17.6 billions in 1938.

[46] Of dwellings by class, tenure, and number of rooms, collected on the Population schedule.

Population.—In this widest field of all, recent theory is modest,[47] but "standard authorities" should not preach birth control in 1930 and proliferation in 1937, however Canute-like either time,—it is disconcerting. I could wish we might likewise catch up on that continental myth, immigration. Now, population is very practical politics: a country definitely must know what is, and whither tends, its population. This includes, (1) all about each population attribute in itself, and (2) the interplay of attributes upon the composite. Especially must Canadians give themselves to think in these channels, for we are but 11 millions on half a continent, much counsel do we suffer on it. The counsel would be bearable if it appreciated Canada's growth process—which is, that we have increased by four times since 1850, but so has the area populated ("area" means space that can be occupied under current incomes and standards of living). It is the relation of area to population nucleus that is important. Our original settlement proceeded from points of distinct saturation, for troughs not levels were left in the rear: 87 inner counties in Canada out of 219 have smaller populations today than thirty, forty, or fifty years ago, or we would have a million more people. On top of land settlement, a second (city) growth-impulse has worked itself out, likewise a spreading. We are told *ex cathedra* that populations do not act in this way, but ours does. How many of such processes are written into our fate we do not know and no "projection" will tell us, though a new cycle is looming. Overspeed has been the prevailing mistake. An interesting fact is, that though no simple curve fits our growth alone, a logistic does fit a compound of growth and area. The *Drosophila melanogaster* bottle was closed: the Canadian bottle is an expanding one.[48]

A by-product is our extraordinary situation *vis-à-vis* our very convenient neighbour. We have but 350,000 American-born in Canada, but 1,250,000 or about 14 per cent of all living Canadian-born are in the United States; extend this to persons of Canadian stock, and a third of us are in the Republic, mostly in clusters just over the border, but we do not call them Sudetens. In the 'eighties, for every thousand added to the native-born in Canada, we donated 726 to you: even in

[47] Cf. Robbin's "melancholy reflection" in *London Essays in Economics*. "To-day we are as ignorant of the causes which govern the birth rate as we were ignorant a century ago of the causes which govern the death rate"—J. B. S. Haldane in *Human Affairs*.

[48] As items: The Maritime Provinces of Canada are in contrast with many other sections of the continent: no new natural resources have been developed, no territory has been added, nor have they experienced much stimulus of industrialization. For Nova Scotia the trend of population from the earliest times until the present forms a logistic, with a slowing up above the point of inflection concurrently with movements into Western Canada and the United States. These episodes over, the curve is returning to form, pending a new cycle. From Jacob to the Census of Moses, and from the earliest settlement of the French until the present is about the same time lapse: the growth of the two populations is the same.

the 1920's we donated 228 per 1,000. Most comment on this is cant. In this last decade, Canada's total population increased by 1,589,000, but as excess of births over deaths was 1,582,000, and as 335,000 Canadian-born returned from the United States, we had 330,000 Canadian-born alone in excess of our increase. Yet we received one and a half million immigrants. Fluidity like this explains why the "optimum" discussion is even more vapid to us than to others, and why a new chapter in the Malthusian controversy is just a sweepstake without a ticket. *Omnibus* interpretation by all means. But what *omnibus?* We mustn't take the wrong one.

Nothing could be more encouraging than the U.S. Report on Population of the National Resources Committee, which surely sets a new mark.[49] In Canada also we "know our way around," though Sweden and the Netherlands beat the world in up-to-the-minute bookkeeping. In this new atmosphere I should like to see the various Census Offices borrow a leaf from the astronomers, and work cooperatively. There should be a minimum list of Census rubrics, and agreement as to cross-classifications. Over and above domestic uses, the fields which need intensive treatment could be parcelled out, and we could help each other with special data.[50] (We have produced a Census machine in Canada that has multiplied such analyses to finality at half the old cost: the United States was the first to develop a Census tabulator, but we have the last and best so far! It sorts and in the same run takes off everything on the card, adding up incomes, time series, etc.!) Only in some such way will we conjoin with biology, sociology, human ecology, in a real science of population, when "robust common sense" like Dr. Johnson's on the birth rate will pass out,[51] together with some latter-day pontification its lineal descendant. As just said, the astronomers' Nautical Almanac (not altogether nautical) is a demonstration visible even to the naked eye of the layman.[52] Moreover, the *I.I.S.* has paved the way, and the Population Union offers a forum. One would not add to "the things of Mary" amid the din and dither of the have's and the have-not's still murdering the Gracchi and prophesying war. But I would think a world census understanding as hopeful *à la Martha* as, say Senor de Madariaga's World Bank or World Mandates scheme. It is true that Senor de Madariaga describes himself as "born in Spain, *but a citizen of the world.*"

[49] Supplemented by *Needed Population Research*, prepared by P. K. Whelpton under the auspices of the Population Association of America.

[50] Of course, there must be more censuses, and some quaint methods of the past must disappear (see Kuczynski's *Colonial Population*); and of course vital and migration statistics must keep pace.

[51] Udny Yule calls it nonsense, but not Harold Wright (*Population*, p. 102).

[52] The International Union of Geodesy and Geophysics (35 adhering nations) supplies another.

V

New Atlantis

But I am overshooting—I come back to the substantive part. The job of defining what applied science has done to society is statistical, and the defining will tell a lot of what to do about it. And the first step towards setting statistics to work in the grand manner thus is their organization in what Knibbs once called an "articulated conspectus" of the national life and affairs. In brief, the statistics of governmental activities, with those created for information, should be subsumed in a general plan, horizontally as well as vertically organized, looking to complete and systematic exploitation of the overhead. The purpose is simply to see the structure whole and as a unison, so that when an essential is missing we shall know continuously, (a) that it *is* missing; (b) why it is missing; and (c) just how and where to make it good. A first-rate example is the need we are just discussing; but if we have a coordinated scheme of production and trade statistics in their social and economic setting, with the interested government agencies tied into it, any special point of view like this can be elaborated or superimposed at a fraction of the cost and labour otherwise. I believe that (1) the Committee set up by the International Council of Scientific Unions, which has the "Science and Society" matter in hand; (2) the League of Nations Committee on Intellectual Cooperation, which also has the identical matter in hand; and (3) the new section of the British Association, which also is to tackle the problem *de novo* and to link up with some similar body here (a World Brain Trust it is already beginning to be maliciously called); would do well, on the principle of first things first, to give attention, not to the creation of new agencies for more materials—not to the *ad hoc* creation of new materials—but to this basal matter of organizing the agencies and recreating the materials we already have, just as the multitudinous and orderly enrolment of stars has been the arduous prelude to astronomy. They must come for this, I fear, like everyone else nowadays, to governments, for governments alone have the two things needful, the powers and the money. To multiply statistics into universes with the needful cross-classifications; to ensure homogeneity so that they shall be usable from multiple points of view; to see that they relate to Government and life in as wide a way as the machinery permits, and to point where necessary to further economical machinery; only organization as an end in itself can compass this. At the top, free and using such organization as working arm, let there evolve great Institutes for Inductive Social Research, to the substitution—with Aristotle's

"inevitability of gradualness," with Science's "approaching truth by successive approximations"—of judgment for improvisation in our important affairs. Under those portals let no *idola* either of the tribe, the den or the market place enter (Hogben would say no Idol of Logic, of Purity or of Caution). Statistics is first of all *les statistiques:* nature is not so kind as in the natural sciences—we have to make our matter. In this connection one grows tired of hearing of "amorphous masses of purposeless knowledge." Purposeless for what? Most of God's factual chilluns got wings.

There was a day when I thought the economists would take this in hand, and some have Nobly: Mr. Keynes never ceases scolding, and Wesley Mitchell once went so far as to say that Government statisticians should have more pay. But mostly statistics are mentioned hopelessly, like something forgotten at the picnic, though Pigou as we saw likens economists to clothiers, and clearly clothiers should have an interest in the textile industry. And I regret to add that cantankerousness in statisticians is not unknown. A Zionist movement, even to a Palestine with no Arabs, has less allure sometimes than spoiling the Egyptians. But the diaspora is reassembling. Specialization in statistics, as in medicine, is the opposite of decentralization: it is the water-tight compartment that is bureaucratic. Here James has a hint for us. His prime exploit was to round up the turbulent Scottish nobility in fealty to the common law. Of this it is enough to remark (of course *à propos de bottes*) that of his six immediate predecessors in the task two were murdered, two fell in battle, one died of chagrin, whilst James himself was more than once the mark of private war. James by the way whittled down his Divine Right of Kings from *in abstracto* to *in concreto*—in other words when faced with hard realities he backed down, as an apriorist always should do, for all he may have the better of the logic.[53]

As for research, the crown of the edifice, he would be insatiable who was not happy in American progress, reaching apex in the Social Science Research Council. In Ottawa you may stand upon a bridge and view the palace of the National Research Council, builded of enthusiasm in the natural sciences. On the other hand is the Bureau of Statistics (it would bore statisticians to dwell in marble halls) crammed with the "makings" of social research of more than local import. Our model has been, shall we say Engel? that great organizer and empiri-

[53] James's son Charles lost his head and his grandson the throne over it (or so the Whigs have always made out, soft-pedalling bourgeois objection to taxes during an upswing of the trade cycle), but not James. It was Cromwell, Ruler (self-elected) of the Saints (self-styled), who called democracy "the Creed of all Bad men and Poor men."

cist.[54] As for theoretic demands (*experimenta luctifera* as well as *fructifera*) why not list those amenable to observation and the statistics they need, hoping that when these are cleared up the unamenable may by the mercy of Providence turn out mostly of no practical use—as they have done elsewhere in Science. On the direct job, one need fear neither Mill's nor Edgeworth's warning as to empiricism, for in such a *milieu* is created that atmosphere of "the artisan thinking about his job" which Salter says accounts for most practicalities: the most important parts of the steam engine were invented by labourers.[55] And it is with the man on the job too that will burgeon that new technique (as with the biologists) which sets the pace for all the rest, still only mewing its youth. One may walk warily (*per ignes suppositos cineri doloso*) over inverse probability vs. maximum likelihood, but yet wish well of R. A. Fisher's simple "making sense of figures," the reduction of the multitudinous so that it can enter the mind, the open mind.[56] Our "method" has certainly not lacked breadth in these late marvellous years, but has it realized conceptual depth? Neyman is demanding a "grammar" of statistics.[57]

The National Economic Council Movement of the 'twenties has some lessons. About 30 were set up in as many countries. Some were for quasi-executive jobs, and these they may have done well enough. But where in the absence of statistical organization they have taken on research, they have petered out or gone on footling errands. The natural sciences can be better satisfied with guerilla warfare than the social. Sweden's newly formed Konjunctur-Institut (to name the absent) is promising.

But how shall we "put across" such doctrine? It is trite to say, by education—but what else? Miss Walker has most adequately reviewed our University teaching of statistics.[58] (I could wish statistical teaching

[54] *The Dominion Bureau of Statistics*, a brochure issued on the occasion of the Conference of British Commonwealth Statisticians, Ottawa, 1935.

[55] *The Framework of an Ordered Society*, by Sir Arthur Salter. Edgeworth considers that if the investigation of the conditions which determine value (the job *par excellence* of abstract economics) were abolished, "there would survive only the empirical school flourishing in the chaos congenial to their mentality." But Hayek, who quotes this against planning, comments, "we are as far from capitalism in its pure form as we are from any system of central planning. The world of today is just interventionist chaos."

[56] "In deductive reasoning all knowledge obtainable is already latent in the postulates . . . the successive inferences growing less and less accurate as we proceed. In inductive reasoning we are performing part of the process by which new knowledge is created. The conclusions normally grow more and more accurate as more data are included. That errors in the knowledge postulated *a priori* will produce less and less effect on the conclusions drawn as the observations are made more and more abundant seems to be a reason not for thinking that the postulate is true but rather that it must be possible to draw valid conclusions without its aid"—*The Logic of Inductive Inference*, by R. A. Fisher, *Jour. Roy. Stat. Soc.*, XCVIII, Part 1, 1935. "It cannot be," says Bacon, "that axioms established by argumentation can suffice for the discovery of new works."

[57] *Nature*, August 6, 1938.

[58] *Studies in the History of Statistical Method*, by Helen M. Walker.

were less "ancillary"—that it had the "sweep" of our Association.) She did not include Canada: I grieve to say she would have found no chair of statistics, and that five of our twenty-two universities do not know the word in their curricula—it is either contrary to the Koran and impious, or agreeable to the Koran and superfluous. Hogben jeers at universities that are never "lying in" hospitals to new sciences, and indeed it is forty years since Pearson declared the logic of statistics as important to teach as the analysis of mathematics.[59] Galileo proceeded by capturing the universities. We statisticians cannot make a "close corporation" of ourselves like the actuaries, though we could be "closer" than we are, and it would be useful to know broadly what is meant when a man calls himself a statistician. The future of statistical quality in no small measure depends on *esprit de corps*.

Still it is public opinion that counts, and the school is more important than the college. Alexandrians like Eratosthenes and Apollonius knew that the earth was round, and how big it was, that the sun was 90,000,000 miles away, and so on, but Epicurus who guessed the sun was two feet wide won out for 1,500 years.[60] Progress is never faster than popular thinking. High-school in my day took us to binomial theorem, but statistics were like railway time tables. It is even so today; "from him that hath not shall be taken even that which he hath" is still a moral conundrum, not just a fact as Pascal showed the gamblers of the seventeenth century (and so on to the life table and all that has come of it.). Statistics is "solid" with big business, but many a business failure results from *naïveté* over short and long chances.[61] Statistical thinking, says H. G. Wells, will one day be as necessary for efficient citizenship as the ability to read and to write.

I believe I mentioned money, and that our Governments had it. They must have, for their united debt is over $40 billions. But the money part should be easy (and without James's guile in money matters). Put it this way: Any business man having $1,000 to spend would gladly pay $8 or $10 for sound factual guidance.[62] Apply this to Governments and it would enlarge us by four or five times. We could pay over then "in our stride" the whole large sum which it is said an indigent world gave the natural sciences last year, and tune them in to social needs as during the War, not holding them up as Lord Stamp suggested—nay, cheering them on. Of course, it is comparatively easy for Science to raise funds, with the Marconis "selling" the Clark Maxwells. But on social benefits, the world is still like Huckleberry

[59] *Life, Labours and Letters of Francis Galton*, II, 418.

[60] *World Machine*, by Carl Snyder.

[61] *The Statistical Control of Business Activities*, by Professor P. H. Hensal in *The Canadian Chartered Accountant*, March, 1938.

[62] The Insurance Companies have a set rule in the matter.

Finn, who when he prayed for a fishing line and was told to ask only for spiritual gifts, just passed it up altogether. But even poets like Tom Harrison are taking up mass observation in Great Britain: they are going in for the "trivialities."[63]

Reverting to popular education, may I proffer an "idea?" Hogben's *Mathematics for the Million* as the title anticipated is a best seller. It relegates statistics to a final chapter. But statistics needs a whole book of the kind. Miss Walker is splendid, but I am thinking for non-statisticians. Moreover, the book should show how social needs have produced the new data and methods, as Westergaarde and Koren have partly done. Why should physics and mathematics have all the thrillers? Hogben writes "for fun" from sick beds and railway coaches. Statisticians are even busier than biologists, and even at such a price, Miss Walker seems "it," brutal as it sounds. She will avoid some ebulliencies.

At this shall I "share" wholeheartedly and egoistically like the Oxford Group? You will recall that the *New Atlantis* was to have had a second "social" part. But Bacon was before statistics, and "the rest was not perfected." In the first enthusiasm for this paper I tried to imagine that unbuilded House of Solomon,[64] uniquely dedicate to means as much as ends: its Towers and Gardens; its Merchants of Light, Compilers, Interpreters and the others; at its head the Father of the House who, says Bacon, "had an aspect as if he pitied men." I could not visualize it save in the four great rooms of the *Magna Instauratio*, statistics and research the third and fourth and most opulent,—equating, synthesising, catalysing this world of "becoming," in terms of occurrences and frequencies. But on closer view some difference developed in me between *a* mind to such an undertaking and *the* mind—so this goes over, shall I say for E. B. Wilson? I do not doubt (for we are not Spenglerians) that creative vision, a rubbing of the eyes to significances in recent scientific thought, with a schema not in shackles but still a schema, is what we need. There are no greater obstacles in the way of the social sciences—no more undiscovered techniques—than were in the natural sciences when "large brow'd Verulan" conceived the *New Atlantis*.

VI

Proliferation

"Here then were an end, if ever anything had an end," but let us have our Pisgah moment.

Political Science: Our ploughshare is for Economics and Sociology

[63] *First Year's Work, 1937–38*, by Mass Observation, edited by Charles Madge and Tom Harrison.
[64] James was "Solomon" to his court—"save only in the matter of wives and concubines."

first, but these will more consciously stem from Political Science in our new New Atlantis. Don Marquis was once a Census Clerk but he did not learn from the Census to make archy the cockroach say:[65]

> i never think at all when i write
> nobody can do two things at the same time
> and do them well,

for a Census must think from forty angles. In any event the happy state (which will take the first perfect census, compiling it in a few weeks on the Canadian machine) is assuredly the free state, deriving from that muniment of freedom won in James's reign—freedom of parliamentary debate. It was once a fear of Lord Bryce that democratic parliaments "obviously" could not gauge public opinion. But to-day statistics can gauge it while we wait, and at a thousandth the cost of an election.[66] It emerges that public opinion on occasion wants incompatibles (to the gross peril of *vox populi vox dei*), and though "it is better to go wrong in freedom than right in chains" (T. H. Huxley), the price of going wrong is going up—we bomb civilians now. This Freedom has never been perdurable: Greece had it and debauched it; Rome had it and crushed it; kept alive by the primitive Church it committed suicide in the French Revolution. Science, which has brought government into every walk in life, has undoubtedly increased autoritarianism, and we have returned to the age of heroes—familiar, bellicose somnambulists who are not asleep one bit. Two remedies have been suggested, each showing our bent statistics-ward. Now that the universe is finite, whether of the Einstein or de Sitter pattern, Bertrand Russell wants a Census of it, for then "venturous and enquiring intellects" will turn to other fields, (as previously from geometry to physics) "altering the whole structure of human life," since our present acquisitive society is only the reflection of our interest in physical laws.[67] The alternative is closer to earth and humdrum: that the free state try and become expert, of which the first task is to distinguish good discipline from bad regulationism, by methods on which in the purely political part an ex-president of our Association has written a good book.[68] The hero's attitude to statistics is significant. Napoleon, whose liberalism never interfered with dynastic business merely banned them publication. But the moderns have multiplied

[65] *Archy and mehitabel*. Archy could not reach the capitals on his typewriter.

[66] *Government and the Sampling Referendum*, by George Gallup (*Am. Stat. Jour.*, Vol. 33).

[67] Our obsession by economic interest is, in R. H. Tawney's excoriation (*The Acquisitive Society*), "as local and transitory as it is repulsive and disturbing . . . as pitiful as the obsession of the seventeenth century by religious quarrels."

[68] *Quantitative Methods in Politics*, by Stuart Rice. Cf. also *The Statistical Method in Economics and Political Science*, by P. Sargant Florence.

them beyond all precedent—so much so, the London *Economist* hints, that they have even statistics for themselves and statistics for giving out—the "splendid lie" of Plato with a vengeance. In these complexities and perplexities a Russian statistician or two have been shot, so we have our martyrology, one hopes a hagiology.

Ethics.—And still I have not mentioned the Good, the Beautiful, the True. Whitehead removes the aesthetic beyond science in the realm of Philosophy,[69] from whose door if we retire on tiptoe it is not without lingering looks, for Science and Psychology are jamming it, and Statistics is not Mr. Worldly Wiseman but Everyman. Of values, by their fruits ye shall know them (Matthew, vii, 20). In Ethics, for example, wherein theology, psychology and jurisprudence commingle, the new criteria of science are for our measurement:[70] in fact we are already measuring prohibitions, whether of institutional law (crime), or of the legislator within the breast (sin). Of succedent punishment (somewhat abated of late by the abolition of hell),[71] we still believe that knowledge of law and a desire to do right are the only *expertise* of a judge, and so blunder ignorantly between sentimentalism and obscurantism, but only until statistics rewrite criminology and penology. Law itself in the days of the *Ecclesiastical Polity* had its seat in the bosom of God, creating vagabonds with one edict and disposing of them neatly on the gallows with another. But like the Archbishop in *Saint Joan* we are less glib than we were with the name of God, (who banishes malaria on the fair condition that we liquidate the mosquito), and jurisprudence upgrows from practice and the "wilderness of single instances."[72]

From the jural concept emerges free-will that age-old dialectic. Quetelet's "budget of the scaffold" exorcised it in vain, and the physicists argue anew the paradox of a predictable crowd and an unpredictable unit. Predictability is a matter of numbers. Democracy is the

[69] *Science and the Modern World*, by A. W. Whitehead.

[70] "Hygiene has transformed resignation in face of epidemic disease from a religious virtue to a punishable offence. . . . Institutions based on short lives have almost wholly collapsed." *Daedalus.*

[71] "We must accommodate our eschatology to a view of the Universe which leaves no room for a geographical heaven and hell." *Scientific Ethics*, by Dean Inge.

[72] As to international law, still wallowing in make-believe, ingeminating peace in terms of war, Sir Alfred Zimmern (*International Affairs*, Vol. XVII, No. 1) describes the League of Nations' Japanese policy as a "double bluff," first because the *jus gentium* based on the Christian ethic has disappeared among European nations, and secondly because Japan is not Christian. Or as Senor Ortega y Gasset puts it, "the League was a gigantic juridical machinery created for the administration of a non-existent law" (*Nineteenth Century*, July, 1938). Yet radio has brought the world within sound of a herald's voice—which was Aristotle's limit to the size of a state; we are not a plurality of nations but a world society; and in general as some one says it should be easier to love your neighbour when you do not have to see him and live with him. If war is psychologic as well as economic, statistics will let Norman Angell distinguish the two faces. "The people who do most completely what is in fact to their interest are those who, on moral grounds, do what they believe to be against their interest" (*Icarus*). Or as P. G. Wodehouse says, we must be kind, and not leave it all to the Boy Scouts.

best science: in its collective mind as well as physical body is the hope of a sane, orderly and progressive world.

Beauty.—As to the beautiful, we are measuring the mechanics of its provocation and apperception, and Max Eastman is asking what literature will do a thousand years hence when trained investigators "with statistics and laboratory findings under their bulging arms" may have the last word on everything.[73] Why do "burlicue" and the "hogwash of the movies" climax our present day aesthetic (the *American Mercury* and Aldous Huxley respectively say they do), and why in spite of painless dentistry do we not write poems of happiness like the Jacobeans? Beauty, Lord Haldane that good Hegelian declares, lies "beyond measurement," but he adds that it is the quality of anything relative to its end—not exactly the beauty of the *Symposium.*[74] Taste and fashion, says Sainte Beuve, are next door neighbours, and to Science after its orgy in Victorianism we owe the simplicity and purposefulness of contemporary art. As to poetry, which Aristotle held to be "a higher thing" (σπουδαιότερον) than history, Dingle and Bertrand Russell make merry over lines in *In Memoriam.*[75] Poetry like music does not make sense, it makes emotion:

> And you shall hear the herb and tree,
> The better heart of men shall see,
> Shall feel celestially, as long
> As you crave nothing but the song.[76]

If Plato banished poetry for plain lies, will science banish "the song?" The last biographer of Ruskin says his economics misfired not because they were wrong, but because Ruskin was a drug addict—his drug the emotive and overpowering language of the James Bible.[77]

Religion.—The word brings me to religion, which is not conduct, though good conduct is a necessity to the mystical experience, even of the neo-mystics like Aldous Huxley.[78] The conflict between religion

[73] *The Literary Mind*, by Max Eastman. Contemporaneously Senor Fassi is making a statistical analysis of the perforations on player piano rolls (*Appunti di statistica musicale*). Plato's preference for the Dorian and Phrygian modes over the Ionian and Lydian had a mathematical basis.

[74] *The Pathway to Reality*, by Viscount Haldane. Lord Haldane lived in the age of the bustle (*et ego in Arcadia vixi*), and no doubt found it beautiful, though the later Haldane calls it a revolution when man's ideal woman ceased to be steatopygous.

[75] Of any event "to which the whole creation moves," says Bertrand Russell, a more correct description would be "to which some parts of creation move while other move away from it," adding that "an emotion which can be destroyed by a little mathematics is neither very genuine nor very valuable." And Dingle says that the lady of the line "the stars she whispered blindly move" might have been comforted by reflecting that she was not a star. George Moore (*An Anthology of Pure Poetry*) calls "pure poetry" only poetry which is objective, born of admiration of the world of things.

[76] *The Lark Ascending*, by George Meredith.

[77] R. H. Willenski in *The Great Victorians*. But Professor Knight wants economics to be "literature" (*loc cit.*)

[78] *Ends and Means*, by Aldous Huxley.

and science has changed since our youth, when Mr. Gladstone and Bob Ingersoll, for example, dealt to each other across the Atlantic such resounding thwacks—they still resound from Tennessee where $\pi = 3$ as at the building of the temple (II Chron. iv, 2). But preoccupation with revelation has turned or returned (pointed by Science) to Whitehead's "adventure of the spirit," which in set terms is not a "rule of safety" from the "curse" which is the end-word of the Old Testament.[79] Meanwhile Science has a new humility—the humility of statistics. In the dichotomy[80] (whose everyday bridge is in service and social ethics) Curtis compares the progress of observational knowledge to a hyperbola which "will never touch the two straight lines to which it is referred, though it will asymptotically come infinitely close after the lapse of unlimited time."[81] This at least charts the paradox of the Spencerian Unknowable, and yet our unending quest of it, to which Spencer himself relates all our progress from Caliban—Man still only in the making, still able to greet the unseen with a cheer.[82] Of the *religious* in statistics let Florence Nightingale, though pre-War, be exemplar—the "passionate statistician" she was called. The world, she believed, was evolved in accordance with a divine plan which it was man's business to discover. "But to understand God's thoughts she held we must study statistics" which thus became for her a religious duty. Her religion was of works, for she was the means of establishing the first Chair of Statistics in an English University.[83]

VII

L'envoi

And so having won to the *odium theologicum* I fitly end on the James *Leitmotiv* born of this occasion. How James would embellish "Science

[79] Darwin delivered the nineteenth century from anthropomorphism, and we have likewise survived the succeeding mechanicomorphism, books like Drummond's *Natural Law in the Spiritual World* marking the transition. Cf. also Bradley's "approximation of knowledge and aspiration . . . so that religion may satisfy the soul of the saint and not disgust the intellect of the scholar." Hogben has disinterred the Bishop who calculated from *Numbers* that man was created by the Trinity on October the 23rd, B.C. 4004, at nine o'clock in the morning, but it is idle sport: within the year the Anglican Commission on Doctrine has rejected both the infallibility of the Scriptures and the resurrection of the physical body—a far cry from the tocsin over *Vestiges of Creation*, the *Origin of Species* or even *Essays and Reviews*.

[80] Eddington's truths of science are not truths but truisms: "non-metrical" laws, the statistical and the transcendental, lie beyond. So likewise Jacques Maritain, the twentieth century Aquinas, (*"vae mihi si non thomatizavero"*) divides science from metaphysics, and both from the mystical union with God, of which Emily Brontë's "Last Lines" remain surely the supreme expression. (*The Degrees of Knowledge* by Jacques Maritain). But Santayana would not call the mystical experience (including Hindu Yoga, Buddhist Dhyana, Mohammedan Sufism, Jewish Cabalism) "truth."

[81] *Scientific Monthly*, 1938.

[82] Even in a "pessimist" like Thomas Hardy:

Consciousness the Will informing till It fashion all things fair.

(concluding line of *The Dynasts*). Bernard Shaw wears his hope with a difference: "Man is on trial. If we are a mistake, God will use other creatures a trifle less stupid to carry out His purpose."

[83] Karl Pearson (*loc. cit*).

and Society," Heaven knows. But, says Gardiner, "James usually sensed better than other people what *sort* of thing it was desirable to do"—an apriorist with a sense of smell; and for certain personal qualities, as I said, even a statistician may warm to this many-sided, modest man, "rather born to *onus* than to *honus*,"[84] scornful of popularity. Whether or not he was Prospero, he had imagination (he was a fair poet) and he had humour, both essentials of our craft. His pedantry, like ours, was better than utopianism. If he "swam" witches, that was *a priori* Science—Scientific Demonology—in 1610[85] Also he "fustigated" the odd heretic: persecution was still good politics and not yet bad economics (*we* stop at a piece of rubber hose). As peace-loving as any statistician, James was always afraid that pistols would go off, nor did Woodrow Wilson nor Neville Chamberlain keep us better out of war in a Europe divided as to-day, in the words of a witty Canadian, "between nations practising the goose-step and nations practising the side-step." He even soothed the Irish. History in Detroit is "bunk," and elsewhere she changes her mind, and I for one am glad if by late accounts James is not the two-headed ass of Macaulay but a civilized, intelligent man—boreal but not arboreal. But I go on talking of him thus till the last late moment only because in one particular I feel his equal—if I may say it in these sloping days of my official life: James prized over all things his English throne, but he could exalt it no more than I do the generosity that has beckoned me at the ending of this pregnant century to be the President of the American Statistical Association.

[84] *Basilikon Doron.*

[85] As in New England a hundred years later, Coke, Bacon, fourteen English bishops and the Scottish clergy to a man applauded James. *History of Rationalism in Europe*, by W. E. H. Lecky, Chap. I. also the *Religio Medici.*

POSTPONABLE PURCHASING OF DURABLE CONSUMERS' GOODS AND THE BUSINESS CYCLE*

By Charles S. Tippetts
University of Pittsburgh

That fluctuations in the production of durable goods have come to play a larger and larger part in determining the pattern of cyclical fluctuations is well-known. The National Bureau of Economic Research has furnished us with comparative figures that reveal the growing importance of durable goods in the pre-depression years. Classifying goods into two broad groups, durable and non-durable, it was found that in 1879 approximately 31 per cent of all commodities produced were of the durable type. Ten years later the proportion had reached 35 per cent. By 1900 there had been another small increase.

During the next twenty years the percentage again rose slowly. Between 1919 and 1929, however, the proportion rose more rapidly until by the latter date durable goods constituted almost 44 per cent of our total production. Thus, between 1879 and 1929, a period of fifty years, the proportion of durable goods to all commodities produced went up from 31 to 44 per cent, an increase of 42 per cent. The impact of the depression of the nineteen thirties, however, brought a tremendous decline in the proportionate production of durable goods. In 1933 durable goods were responsible for only about 27 per cent of the total, much less than in 1929. The difference between 1929 and 1933 is a fact of great significance.

While the production of *durable* consumers' goods was falling 57 per cent between 1929 and 1932, *non-durable* consumers' goods fell only 20 per cent. By 1934 non-durable goods were only 14 per cent below 1929, but durable consumers' goods were still down 41 per cent.

Bulletin 52 of the National Bureau of Economic Research presents interesting figures which enable us to compare the importance of durable consumers' goods with other types of commodities in prosperity and depression. Rising from 17 per cent of the value of all commodites produced in 1919 to 23 per cent in 1926, the proportion of consumers' durable goods to the value of all commodities produced fell to 12.5 during the deepest days of the depression.

Broadly speaking, there are two classes of durable goods: (1) Those used to produce other goods (producers' durable goods), and (2) those used for purposes of consumption (consumers' durable goods). Most of the attention of students of the business cycle, has until recently been directed primarily to the former.

* Summary of a paper presented at the One-hundredth Annual Meeting of the American Statistical Association, Detroit, Michigan, December 30, 1938.

What is a consumer's durable good? It is fairly well agreed that a *producer's* durable good is something that is not used up in a single act of production. But how many times should it be used if it is to be classified as durable? To distinguish consumers' *durable* goods from consumers' non-durable goods presents a similar problem. As one reads the literature it is found that the setting of an arbitrary time limit before the commodity wears out, or must be replaced, is the usual test. But, what should the time limit be, one year, two years, three years or more? Moulton, Garver, and Hansen have chosen three years as the limit for durable goods in general. The texts on the Economics of Consumption which have recently been appearing in impressive numbers have for the most part settled upon the three year test.

The most prominent kinds of consumers' durable goods are generally agreed to be automobiles, house furnishings, jewelry, electric refrigerators, furniture, books and pictures, musical instruments, vacuum cleaners, washing machines, electric and gas ranges and other electrical equipment, radios, etc. Some authors even go as far as to include buildings used for residential purposes.

One of the distinguishing characteristics of a durable good is that the demand for it is postponable. This is true both of producers' and consumers' durable goods. There are necessities which must be purchased if life is to be sustained, or a minimum level of subsistence is to be maintained. But the purchase of most durable commodities is not a matter of absolute necessity, unless it is a kind of producers' good that is required if production is to continue. There are many such producers' goods. The purchase of most consumers' durable goods can readily be postponed. They are not, for the moment, absolutely necessary. A decline in income results in *compulsory* postponement of the satisfaction of desires. The consumer must spend his money on those things that he regards as most essential. But income may not decline and still there may be postponement of purchasing. This is *voluntary* postponement.

Voluntary postponement may be due to a number of reasons. For example, we have heard much of a consumers' strike in 1920 and 1921. We also have been told that a consumers' strike occurred in 1930 and 1931. In fact many persons blamed most of the depression on that. This did not arise from a resistance to rising prices, but from the contrary. Prices for many products fell precipitously from 1929 to 1932. The argument runs that when prices start to fall everyone, who can, will postpone buying in the expectation that products will become even cheaper. There is little doubt that falling prices do have this result. The belief that such a consumers' strike existed was largely

responsible for the "Buy Now" campaign of 1931. A similar plan was instituted in 1938 in the form of the "National Salesman's Crusade." In the *Review of Economic Statistics* for last August, Sumner Slichter has presented evidence showing that consumer strikes actually take place.

It is difficult to determine precisely how much *voluntary* postponement of buying consumers' durable goods there actually is. The general impression is, and it is probably correct, that such postponement takes place to an important degree in years such as 1930, 1931, 1932, and 1933. The growth in savings deposits in depression periods would appear to afford some proof on this point. In spite, according to Kuznets' figures, of a $300 drop in per capita income in these years, there were still persons with enough income to have bought considerably more than was actually purchased.

I have already discussed the growth in importance of consumers' durable goods in an economic system. It is recognized that the demand for such goods is a readily postponable and therefore a widely varying one. When the buying of a large part of our national production can be delayed, the effect is to accentuate the peaks and the valleys in the cycle.

As the period of recovery begins and consumers have less fear of what the future will bring there is unleashed a demand for many kinds of products. As this demand grows, the principle of acceleration, so ably developed by J. M. Clark, begins to show its effect. The result is that all through the economic system activity is intensified, income is increased, and demand still again enlarged. In his recent book *Full Recovery or Stagnation*, Alvin H. Hansen states that recovery after 1934 was based to a large extent on a rise in demand for durable consumers' goods. He writes (p. 277) "The prolonged deflation had restrained many people from buying new automobiles, household appliances and other durable goods. Instead they had chosen to hold in suspense, for subsequent use, available or potential purchasing power. The improved psychology following the banking and monetary reforms, combined with the growing need for replacements—a need more and more urgently felt as the existing stock becomes increasingly obsolete—released an accumulated backlog of consumers' demand for durable goods. As the purchase of durable consumers' goods increased, new investments in plant and equipment had indeed to be made not only in the industries directly supplying these products but also in all the underlying contributing industries from steel to machine tools."

Durable consumers' goods appear, therefore, more and more to be playing a rôle similar to that played in the past by capital goods. As

J. M. Clark says in his book *Some Strategic Factors in Business Cycles:* "The intensity of cyclical fluctuations apparently depends not so much on whether the goods are for consumers or producers as upon their durability" (p. 76). Cycles have been largely the result of the concentration of the production of capital goods in a relatively short space of time. The production of consumers' durable goods has come more and more to be so concentrated. Since these goods are subject to use over a relatively long period of time replacing of them can be delayed at the approach of hard times. But replacement demand is the subject of another paper to be given this morning.

This "bunching" of purchasing is aggravated by the practice of making payments on the installmant plan. Just as in the nineteen twenties, installment buying of consumers' durable goods played a real part in the recovery of 1935, 1936, and 1937. The rapid growth of companies financing installment credit, some of them giving unreasonably easy terms at unreasonably high cost, has introduced another unstable element in the situation. It has aggravated the rise and aggravated the fall, since income that is mortgaged to pay debts cannot be used for current consumption.

It is true that buying on the installment plan may create income somewhere in the economic system. A recovery based largely on consumption, such as that of 1935 and 1936, must, however, keep moving. If the rate of increase in consumption begins to slacken, forces will be released that tend toward deflation. New investment based entirely on a rise in consumer demand may not be sufficient to maintain high business activity. One difficulty is that the installment plan, by encouraging larger purchases, purchases made in advance of realized income, will cause the temporary saturation point in the market to be reached more quickly. The ensuing drop will, therefore, be more abrupt than it would have been had the growth been steadier.

Norman J. Siberling, in the *American Economic Review* for last August lays the blame for part of the wide fluctuations in the residential building cycle on the system of financing in that industry. Prospective builders of homes have been encouraged to go too heavily into debt in good times. Similar troubles arise in other parts of our system when financing has been too easy. The conclusion holds for the methods of financing consumers' durable goods.

The influence of consumers' durable goods on future cycles depends largely upon the depth and extent of the market still remaining to be exploited and the methods of financing employed. Price reduction may be of great assistance, but this is discussed in another paper this morning. If national income again reaches high levels there will be

opportunities for selling goods over and above replacement demand. If the domestic market should reach the saturation point, these industries will then depend largely on the demand for repairs and replacements. This should eventually bring about greater staiblity, but on a much lower level of production. Perhaps new products will then be discovered. If they come forth in large numbers and enjoy rapid growth we shall repeat the history of the past twenty years. New industries and new products, requiring large investment, now constitute our most pressing need if we are to move forward to full recovery. But dependence upon new industries to give us prosperity means that we still be subject to disturbing and unsettling factors, factors of great instability. *Without* new industries, requiring large investment, we appear to stagnate and remain in the economic doldrums. *With* them we shall still be subject to fluctuations of great intensity and unpredictability in the business cycle.

Our great need is to find some method of smoothing out the production of durable goods. So long as we continue to produce them in "bunches," just so long shall we have booms and depressions. One remedy suggests control of the flow of capital into industries producing durable goods. It is difficult to see how this can be done, however, until we subject ourselves to a completely regimented economic system.

PRODUCERS' GOODS PRICES IN EXPANSION AND DECLINE*

By Lloyd G. Reynolds
Harvard University

The term "producers goods" is ordinarily used to include both unfinished goods and capital equipment. This usage confuses several separate problems. The study of fluctuations in processors' margins, for example, requires one sort of approach. The question of the cost of capital equipment and the relation between the level of equipment costs and the amount of investment is quite another matter. Only this latter problem is examined here. Discussion is confined, moreover, to the experience of the United States since 1929. The material presented, while suggestive, is not adequate to support any generalizations concerning the cyclical behavior of prices.

Most of the indices discussed below rest directly or indirectly on the wholesale prices collected by the Bureau of Labor Statistics. The difficulty of securing adequate price information is so well known as to need no elaboration. The particular prices selected may not be representative or may cease to be representative of the array of prices at which any product is sold. The quality of the product may change rapidly. Discounts and other terms of sale may change while the nominal price remains unaltered. In closely-controlled industries such as aluminum and sulphuric acid, quoted prices serve as a façade behind which the seller strikes a separate bargain with each buyer During prolonged depressions indices based on quoted prices do not show the full extent of the price decline.[1] It is unfortunately impossible to say whether this discrepancy between actual and nominal prices is greater in the case of capital goods than of other goods. There is some reason to believe that this may be the case. In any event, the uncertainty concerning the basic price data introduces a speculative element into all of the statements made below.

The National Bureau of Economic Research prepares group indexes for "building materials" and for "goods destined for use in capital equipment."[2] Each group is divided into "raw" and "processed" ma-

* A paper presented at the One-hundredth Annual Meeting of the American Statistical Association, Detroit, December 30, 1938.

[1] During the last depression, for example, the prices of virgin aluminum, sulphuric acid, and cement fell considerably farther than the B.L.S. series indicated. (Table I.) It is only fair to add, however, that these are extreme cases. For most consumer goods and many capital goods, including iron and steel rolling-mill products, the B.L.S. indexes seem to be quite reliable.

[2] The weights used in these indexes are not entirely satisfactory. In the building materials index, iron and steel products are given a weight of approximately one-third. Brick and cement, which together easily outweight steel products in actual construction, receive only half as much weight. The index of goods entering into capital equipment gives half of the weight to iron and steel products, and an additional quarter to automobiles and trucks; other products are correspondingly under-represented.

terials, and indexes for these sub-groups are also prepared. Since we are interested primarily in the prices which businesses must pay for equipment, only the indexes for processed materials are presented in

TABLE I
PRICE INDEXES OF SELECTED PRODUCERS' GOODS 1929–1935
(1929 = 100)

Year	Sulphuric acid		Aluminum ingots		Portland cement	
	B.L.S.*	Census†	B.L.S.	Census	B.L.S.	Census
1929	100.0	100.0	100.0	100.0	100.0	100.0
1930	100.0	—	97.9	—	100.0	—
1931	100.0	99.7	95.8	72.0	86.5	75.0
1932	100.0	—	95.8	—	84.1	—
1933	100.0	87.9	95.8	64.2	93.8	89.9
1934	100.0	—	88.4	—	102.2	—
1935	100.0	90.7	83.9	76.6	103.9	89.9

* Bureau of Labor Statistics series converted to a 1929 base.

† Unit values obtained from the Census of Manufactures and converted into index numbers on a 1929 base.

Table II. During the decline of 1929–32, these indexes fell by only about 20 per cent, while the prices of all processed goods fell by 26 per cent. During the subsequent recovery the situation was reversed,

TABLE II
PRICE INDEXES OF GOODS ENTERING INTO CAPITAL EQUIPMENT, 1929–1938

Year	All commodities processed† (1929 = 100)	Goods for use in capital equipment-processed† (1929 = 100)	Building materials-processed† (1929 = 100)	Relative price movements	
	(1)	(2)	(3)	(2)/(1)	(3)/(1)
1929	100.0	100.0	100.0	100.0	100.0
1930	93.8	92.7	95.0	99.9	102.4
1931	81.3	85.7	85.9	105.4	105.7
1932	73.8	81.4	79.4	110.3	107.6
1933	75.5	79.9	82.5	105.8	109.3
1934	83.5	86.3	89.6	103.4	107.3
1935	86.9	85.4	89.1	98.3	102.5
1936	86.0	86.4	90.1	100.8	104.6
1937	92.3	97.1	99.0	105.3	106.6
1938*	85.2	98.4	93.5	115.5	109.7

* October.

† Data from 1929 through June, 1936, were obtained from Mills, F. C., *Prices in Recession and Recovery*, pp. 501, 510, 513. These series are kept up to date by the National Bureau of Economic Research, and recent figures were kindly provided by the Bureau.

and by 1935 the 1929 relationship had been approximately re-established. During the depression of 1937–38, prices of consumable goods once more fell rapidly while the prices of many investment goods re-

mained almost unchanged. In October, 1938, the price of building materials was 10 per cent higher relative to prices in general than was the case in 1929, while the relative price of goods entering into capital equipment was higher by 15 per cent. It is interesting to note that British building material prices, in a very different cyclical context, behaved in very nearly the same way.

The price of goods *entering into* capital equipment, however, is not the same thing as the price of capital equipment. The price of building materials is not the same as the price of buildings. Information concerning the prices of machinery and new buildings is exceedingly unsatisfactory. An adequate construction cost index would take into account not only changes in material prices and wage rates but also changes in building design, materials used, construction methods, labor productivity, and the level of contractors' profits. Most of the indexes actually in use, however, are simply weighted averages of material prices and wage rates. Nominal rather than actual prices and wages are commonly used, and no account is taken of changes in productivity, construction methods, or profits. These indexes tend to diverge farther and farther from the true level as one recedes from the base year, and also fail to reflect the full decline of construction costs during depression.[3]

The four indexes presented in Table III are probably among the more reliable. The Aberthaw and Fruin-Colnon indexes give the replacement cost of an identical factory building. The Boeckh and Handy indexes, while built up synthetically from labor and material costs, appear to be prepared with unusual care. These indexes show a fall of from 10 to 15 per cent in construction costs between 1929 and 1932. This must be taken, however, as only a very rough approximation. The Boeckh indexes, which give a fairly complete coverage of the country, show very different movements in different areas. It is possible that construction costs in New York City fell by as much as one-quarter. In the Middle West they seem to have declined much less. The Atlanta index shows an intermediate movement and was chosen for Table III on this account. The lag of construction costs behind general prices during the decline was not entirely corrected during the revival. In 1937 most construction cost indexes were several per cent above the 1929 level, while the prices of manufactured goods were still 8 per cent lower than in 1929.

No general index of machinery prices is available for the United States. Road-building machinery seems to have fallen about 7 per cent

[3] For an elaboration of this point see Chawner, L. J., "Construction Cost Indexes," this JOURNAL, 30 (1935), 561.

between 1929 and 1933, farm machinery about 10 per cent, steam locomotives and passenger cars about 12 per cent, railroad shop machinery and power plant generating equipment almost 20 per cent. If a general index could be obtained, it would probably show a decline of not much more than 10 per cent during the depression. Machinery prices rose rapidly during the recovery. In 1937 most types of machinery, with the exception of farm machinery, cost from 5 to 10 per cent more than in 1929, though general prices were 8 per cent below the 1929 level.

These changes in quoted prices, however, do not give a complete

TABLE III
CONSTRUCTION COST INDEXES

Year	All commodities processed (N.B.E.R.)	Public utility systems, North Central Region (Handy)	Factory building, Connecticut (Aberthaw)	Factory building, St. Louis (Fruin-Colnon)	Commercial and factory buildings, Atlanta (Boeckh)	
					Steel	Brick and steel
1929	100.0	100.0	100.0	100.0	100.0	100.0
1930	92.8	98.7	97.9	98.1	96.8	93.5
1931	81.3	96.6	92.6	92.9	86.7	89.9
1932	73.8	92.8	88.4	84.4	86.2	87.4
1933	75.5	90.5	89.5	85.7	83.9	88.4
1934	83.5	98.5	93.2	90.5	96.5	96.6
1935	86.9	100.3	93.2	87.7	94.6	95.7
1936	86.0	102.6	97.4	88.6	94.6	96.0
1937	92.3	111.6	105.3	99.5	103.3	104.8
1938	85.2*	114.4†	101.2§			

* October.
† First half.
§ June.

Notes on the indexes:

1) Handy Public Utility index: A synthetic index, prepared for five regions of the United States. Basic material prices are obtained from trade journals but are checked wherever possible against prices actually paid. Labor costs are obtained from the Bureau of Labor Statistics and the National Association of Builders' Exchanges. Prices of equipment are obtained from nationally known manufacturers. Each of these is put into index form, and the combined index is prepared by the use of weights developed through analysis of a large number of actual contracts.

2) Aberthaw index: Based on the cost of constructing an 8-story reinforced-concrete industrial structure built by the company in Connecticut in 1914. The index is brought up to date quarterly by preparing a complete new estimate, in detail, of the original structure as of the current date. Changes in the prices of building materials, wage rates, and labor efficiency are taken into account. Union rates rather than actual wage rates are used, however, and the index does not take into account improvements in the design of the building.

3) Fruin-Colnon index: Based on the estimated cost of reproducing a 5-story industrial plant constructed by this company in St. Louis.

4) Boeckh indexes: Synthetic indexes, computed for 16 areas in the United States and for several different types of building. Prices of materials are obtained from local building-trade papers. Prevailing rates of wages are obtained primarily from contractors. An arbitrary labor-efficiency correction is used, based on the organization's study of labor conditions in each area. Weights are based on studies of actual building costs and vary with the different types of structure. (The Atlanta index was selected because of its median character. Between 1929 and 1933, for example, the New York index for steel commercial and industrial buldings fell 22 per cent, while the St. Louis index fell only 9 per cent.)

account of what has happened. Some types of machinery were greatly improved during the depression years, so that the cost per unit of product was much reduced. Hosiery machines, for example, became wider and faster, while in printing entirely new types of machinery were introduced. In other cases concealed reductions were given in the form of larger allowances for second-hand machines. These second-hand machines, moreover, were offered on the market at very low prices. A weighted index of the prices at which machinery actually changed hands during the depression would have to take into account sales of second-hand as well as of new machines. It should be remembered, too, that sellers of machinery commonly take payment over a period of several years. Textile machinery manufacturers in their eagerness to sell equipment have become in effect part owners of many businesses. Under these conditions the burden placed on the buyer may be lightened considerably without any change in quoted prices.

TABLE IV

PRICE INDEXES OF SELECTED TYPES OF MACHINERY, 1929–1938

Year	Farm machinery* (1926 = 100)	Electric power plant equipment† (1929 = 100)	Roadway machines	Railroad equipment§ shop machinery (1929 = 100)	Steam locomotives
1929	98.0	100.0	100.0	100.0	100.0
1930	96.4	94.3	99.3	92.2	103.2
1931	93.5	88.4	98.3	86.9	97.9
1932	89.8	80.9	93.3	81.2	89.4
1933	87.7	87.7	93.3	81.2	88.3
1934	89.5	98.9	99.3	93.7	93.6
1935	91.6	98.2	99.3	93.7	100.0
1936	92.3	98.6	99.3	93.7	100.0
1937	92.0	109.3	108.8	103.7	108.5

* Revised Index of the Bureau of Labor Statistics.

† C. F. Lambert replacement cost index, published in the *Engineering News-Record*. It is not known to what extent the index allows for changes in the quality of equipment. The series above is for generating equipment only, but distribution equipment shows a similar movement.

§ Replacement cost indexes, prepared by the Engineering Section, Bureau of Valuation, Interstate Commerce Commission, but not examined or passed on by the Commission. The indexes were converted from a 1910–14 base to a 1929 base by the writer.

If existing indexes can be trusted, the price of capital equipment fell during the depression by something between 10 and 15 per cent, while the price of all manufactured goods declined by 26 per cent. For the reasons indicated above, these figures probably exaggerate the divergence of capital goods prices from general prices, but it seems almost certain that a considerable discrepancy developed between 1929 and 1932. This discrepancy was not seriously reduced during the recovery period, for capital goods prices rose about as rapidly as the prices of

all manufactured goods. In 1936, then, prices of new buildings and machinery were some 10 per cent higher relative to general prices than in 1929. The depression of 1937–38, of course, widened the gap still farther.

The reasons for the relative stability of capital goods prices during depression are not particularly obscure. The market for a specialized machine is quite limited, and the equipment necessary to make the machine is very expensive. For technical and economic reasons, then, a given capital good is likely to be produced by only a few firms. This control of the market is further strengthened by patents, restrictive agreements, and other devices. Where there are only a few producers, however, a price cut by one is certain to become known very quickly and to be followed by all the others. The incentive to make price reductions is thus much reduced. During periods of depression there might even be an inducement to raise prices if the demand curve in falling has also become less elastic. That this is not done more frequently is probably due to fear of public opinion and of government action rather than to profit considerations.

Producers will usually argue that this is the whole story. There is no consultation about prices, they contend—no consultation is necessary. All producers, knowing the demand situation and seeking a profit, come to identical decisions as to what the price should be. Here, truly, is the "invisible hand" at work. But is this explanation convincing? In the absence of any consultation, one would think that producers might reach different conclusions about the correct price because of differences in their costs and in their estimates of demand. Through reductions first by one producer then by another the price structure would gradually be higgled downwards. The avoidance of such reductions over months or years of declining demand must indicate some sort of joint action. This need not be a clear-cut price agreement, but may be a conventional method of pricing (for example, price leadership), or simply a strong tradition against price-cutting supported by the pressure of group opinion and perhaps by economic sanctions. While the courts draw a distinction between agreement and tradition, their effect on price policies may be much the same.

It is frequently stated without much argument that the stability of capital goods prices seriously aggravates cyclical fluctuations, and that if these prices could be reduced promptly during a recession investment would be stimulated and the decline of general business checked. Let us examine this view. Anyone engaged in the heavy industries will agree that the demand for capital goods at a given time is inelastic. To take only two examples: During the last depression the Boston

Building Trades Council wrote to a large number of companies, including manufacturers, utilities, wholesalers, and retailers, to inquire whether a reduction in wage rates and therefore in construction costs would alter their building programs. In every case they received a negative reply. Again, a prominent manufacturer of machine tools writes:[4]

> Since the experience of 1920 and 1921, in which an attempt was made by several machine tool builders to increase sales by lowering prices, it has been the general belief in our industry that this is a hopeless process, and it has not since been tried . . . Any given proposal is ordinarily based on the length of time required to pay for the new investment. This time has to be so short to be attractive that it has to be an absurdly good proposition anyway, and 15 per cent on the investment one way or the other doesn't seriously handicap or seriously improve the proposal.

The demand for capital goods depends primarily on the rapidity with which new products and new productive methods are being developed, and on producers' anticipations concerning the future. If these anticipations are extremely favorable high prices for capital goods will probably not prevent an investment boom, while in periods of general pessimism reduced prices will probably do little to stimulate investment. It follows that the main effect of reducing capital goods prices during a recession would be to transfer a certain amount of purchasing power from capital goods producers to capital goods purchasers. Unless there is some reason for thinking that the purchasers are more likely to spend the money—which seems doubtful—the price cut will probably have little effect on the course of the recession.

This general statement, however, needs to be qualified in at least three ways. First, with regard to the particular product under consideration: among the many thousands of steel products, for example, some will have a more elastic demand than others, and an indiscriminate policy which freezes the prices of all of them must be regarded as unfortunate. Second, the situation will be somewhat different at different points in the cycle. The demand curve for capital goods probably changes its shape as well as its position during the course of the cycle. It may, for instance, become more elastic during the first months of a recession, less elastic as recession deepens into depression, more elastic during recovery, and less elastic once more toward the peak of a boom. A price reduction in the early stages of recession or at the beginning of recovery might well have a considerable effect. The way in which the price change is made, finally, will affect the result. A small reduction which leads buyers to expect further reduc-

[4] Letter cited by S. H. Slichter in "Corporate Price Policies as a Factor in the Down-turn of 1937," *Proceedings of the Academy of Political Science*, 1938.

tions will probably cause them to hold off the market. If buyers could be assured that the new prices would be maintained for some time, sales might be increased. If the reduction was coupled with an assurance that after a specified period prices would revert to their former level, a still different result would be obtained.

TABLE V
OUTPUT OF BUILDINGS AND MACHINERY, UNITED STATES AND GREAT BRITAIN, 1929–1935
(1930 = 100)

Year	United States*	Great Britain†
1929	118.8	98.9
1930	100.0	100.0
1931	74.3	94.4
1932	47.6	90.7
1933	45.8	99.0
1934	52.3	109.6
1935	69.7	116.6

* Simon Kuznets, *National Income and Capital Formation, 1919–35*, p. 40. The following elements of gross capital formation are included in the above index: residential construction, business construction, public construction, flow of producers' durable commodities.

† Colin Clark, *National Income and Outlay*, p. 182. Clark's figures for "home consumption of capital goods" were deflated by using his index of capital goods prices (p. 197). Clark includes in his estimates all building and contracting, general engineering, electrical engineering, ship-building, commercial vehicles and aircraft, and railways. The two indexes are thus roughly comparable.

While a discriminating policy of cutting the right prices at the right times in the right way might reduce the swings of the cycle, it is probable that only slight gains can be made in this way. Conversely, it is not at all impossible to maintain a high level of investment even with a high level of capital goods prices. It appears from Table VI that the prices of building materials and machinery in Great Britain remained relatively high during the years after 1929. In striking contrast with the experience of the United States, however, the output of buildings and machines for the home market fell by only about 10 per cent between 1929 and 1932 (Table V). The two situations are not strictly comparable, since in Britain the level of investment was maintained in part by large public expenditures on housing and other public works. The experience of Britain and of Sweden suggests that a decline of investment may be checked in spite of relatively high prices of capital goods.

The effect of rigid capital goods prices on the secular trend of investment is probably more important than its effect on cyclical fluctuations. Professor Mills has pointed out the divergence between the prices of capital goods and consumable goods during the twenties. During the thirties this divergence has tended to become even greater.

TABLE VI
CONSTRUCTION COSTS AND MACHINERY PRICES, GREAT BRITAIN, 1929–1937
(1930 = 100)

Year	All articles*	Building materials*	Construction costs†	Machinery exported§
1930	100.0	100.0	100.0	100.0
1931	87.8	96.4	97.9	102.1
1932	85.6	94.5	96.3	97.4
1933	85.7	92.5	92.6	101.8
1934	88.1	92.6	—	98.5
1935	89.0	93.8	—	100.6
1936	94.4	96.0	—	103.3
1937	108.7	104.2	—	108.8

* Board of Trade Revised Index of Wholesale Prices.

† *Illustrated Carpenter and Builder.*

§ This index, reported quarterly in the *Board of Trade Journal*, is based on the average value per ton of machinery exported. Different types of machinery are weighted according to their relative importance in export trade in 1924. The index has the serious disadvantage that it overlooks changes in types and design of machinery.

The long down-swing of prices which began in 1920 has been resisted much better by the makers of capital goods than by other producers. This situation must be held partly responsible for the stagnation of private investment in recent years. New products and new processes are continually being developed and struggling for acceptance. A high level of capital goods prices must surely make business men less willing to embark on new ventures, while a lower cost of investment would assist the victory of the new over the old which is called economic progress.

It is easier to point out the undesirable consequences of existing price policies than to suggest remedies. This particular problem, indeed, seems to me impossible of solution if one accepts the existing institutional framework in its entirety. The only methods which would produce results probably involve a considerable expansion of public enterprise. Here, however, one becomes involved in political arguments which cannot be elaborated in a brief paper.

PRICES OF CONSUMERS' GOODS IN EXPANSION AND RECESSION*

By Henry B. Arthur
Swift & Company

THE TOPIC of price policies naturally calls to mind the recent controversy over the distinction between so-called "administered" and so-called "competitive" prices. Industrial price policies are frequently misrepresented as the arbitrary determinations of the managers who represent America's "sixty families" or its well-known "two hundred corporations."

The differential behavior of prices, however, particularly of consumers' goods prices, has a much deeper root than the minds of the individuals who have this alleged nefarious power over our economic system.

The freedom to "administer" prices (where it exists at all) occupies a fairly narrow field. In reality it is much narrower, even, than the calculations made by students of monopolistic competition are likely to assume. In actual practice there are almost always limitations on price setting which are imposed by trade customs, by buying as well as by selling habits. More important than these customs, and explaining many of them, are the specific characteristics of the commodities themselves, such as perishability (particularly true in the meat industry); inability to forecast or control supply or demand; and, for many articles, the uncertainty as to the perishability of patent benefits, style exclusiveness, and the like. Interwoven with such factors is an emphasis in a number of the more mature industries upon what is called "trade position," which it is hard for persons outside the industry itself to understand at all. Often more important than profits themselves is the protection of trade position.

In spite of a number of conspicuous exceptions, price behavior and pricing policies are in general a result of the economic characteristics of a commodity. Even in highly specialized lines like electric razors, it does not take long for wide margins to stimulate new competition and price cutting.

PRICE FLEXIBILITY

If one gets away from the stigmas of the terminology "administered" and "competitive" and looks for real causes, there is no doubt that an analysis of prices on the basis of their flexibility is a useful approach.

Here it is well to consider cyclical amplitude rather than short-time

* A paper presented at the One-hundredth Annual Meeting of the American Statistical Association, Detroit, December 30, 1938.

flexibility. Many questions might, of course, be raised as to the business cycle significance of prices which vary daily or hourly as compared with slow-changing prices which vary only a few times a year or even less frequently. However, short-time variability is not directly applicable in this discussion. Moreover, available price statistics are themselves often summary or sample measures which are not reliable for that particular purpose.

Nor is it necessary to consider the long-range questions of low-price policies as against high-price policies, as discussed in the recent publications of the Brookings Institution, particularly in the book, *Industrial Price Policies and Economic Progress*, by Nourse and Drury. These authors present chiefly a long-range argument which has only indirect cyclical implications.

Relative price flexibility in a cyclical sense is important. But at the outset it should be said that the reasons for flexibility are both deep-rooted and complicated. Even such very ambitious control schemes as we have seen in recent years in agriculture as well as in industry cannot hope to alter certain underlying causes of differences in price movements. The most that can conceivably be expected is some cushioning of the extremes in highly flexible prices and some hastening of adjustments in inflexible ones.

This much should be said of the effect of inflexible prices as a factor in the business cycle. A consistent adherence to any theoretical case in this regard will have to account for an accentuation of upswings as well as downswings. The so-called inflexible-price commodities are very seldom blamed for the accentuation of booms on the ground that they fail to advance fast enough or far enough to retard output or consumption. There is no lack of discussion, however, to the effect that their failure to decline more sharply increased the severity of depressions.

Inflexible prices, or, more important, the causes and consequences of price inflexibility, are unquestionably significant. For example, the relationship between inflexible prices and inflexible costs has received all too little attention. However, since my topic deals with consumers' goods, rather than with capital goods or services, it has seemed worth while to leave the discussion of inflexibilities to other speakers and to raise some very serious questions relating to *flexible* prices.

I am convinced that economists generally have overlooked an important business cycle factor which lies in the relationship between costs of raw materials, prices of finished products, and the valuation of inventories. They have perhaps been so dazzled by the spot-light given to price inflexibilities that other aspects of price behavior have been largely obscured.

PRICES AND PROFITS

The particular problem of inventory appreciation and losses has been neglected, partly because so much emphasis has been placed upon studies of price spreads and margins, rather than upon the effects of price fluctuations on business accounts and business policies.

The spreads between raw material prices and finished goods prices lead to a rough measure of the profits to be derived from manufacturing operations. These measures are useful and suggestive, and they have been widely used for analytical purposes. However, any complete explanation of price policies, or of profits and their part in the business cycle, cannot overlook two points which are nearly always neglected in an analysis of current price spreads or margins.

In the first place, because of the rules of bookkeeping, business profits as shown in the account books are based upon past costs of raw materials rather than current costs. These past costs in many businesses refer to a varying number of months' lag, depending upon rates of turnover and changes in inventory policies. The fact that profits depend upon past costs, so far as raw materials are concerned, is one of the reasons why so many businesses show profits in periods of rising prices regardless of the changes in current price margins—that is, in replacement costs.

The second point, which is closely associated with the first, concerns prices as they affect profits through inventory valuation. This is an extremely important element in many businesses and it deserves much greater recognition than it has been accorded by economists and statisticians.

The clearest observation of the phenomenon of "price profits," or inventory profits as they are more often called, can be obtained in industries manufacturing or processing consumers' goods. They are important, however, in all businesses which buy and sell commodities at fluctuating prices. The importance is roughly proportionate to the amplitude of the price fluctuations and to the relationship of the total value of inventories to the average earnings of the business. Strangely enough, this criterion has seldom been mentioned as a tool in financial analysis work.

The following figures are based upon the results of Swift & Company, although the same point could be demonstrated from the records of any number of companies which have reported losses in years of declining prices. In the fiscal year ended last October, this company reported losses in excess of three million dollars. An examination of the Company's balance sheet, however, showed that inventories were reduced in value from $109,000,000 a year ago to $86,000,000 this year —a decline of nearly $23,000,000. Only a very small part of this de-

cline was accounted for by a reduction in inventory quantities; by far the bulk of it was a result of the lower prices at which inventories were valued.

What these figures mean is briefly this: While the Company's products were sold for around three million dollars less than the cost of those products, including processing and marketing costs, they were sold for a great deal more than the cost of replacing the products in the inventory.

How much more has not been specifically stated by the Company, but an idea can be gained from the fact that the Company was able to pay over seven million dollars in dividends, to retire $1,000,000 worth of bonds, to increase its fixed investments, and still finish the year with very considerably more cash and marketable securities than it held at the beginning of the year.

The item that was nominally liquidated to make such large amounts of cash available was the inventory item. But as stated above the Company finished the year with its physical volume of inventories not greatly changed from the year earlier.

The $3,000,000 loss can certainly not be considered an out-of-pocket loss, or at least not a "cash" loss, because the Company finished the year after paying regular dividends and other charges with substantially more cash than when it started.

There is certainly something paradoxical about results of this kind. So far as any essentials in the operation of the business are concerned —cash, inventories, etc.—the Company was in as good or better position to carry on than it had been when the year began. The lower unit value of inventories does not mean that the Company suffers in any economic sense, because its inventories are not liquidated but are kept in the business year in and year out. They consist of meats and other products in process or on their way to market. They are, like the water that fills the pipes of an hydraulic system, always present as a part of the capital needed in the business.

The business cycle importance of the situation just described is tremendous. Because of the fact that only a minority of businesses recognize that inventory losses of this sort are fictitious, their book results lead them to a policy of drastic curtailment in periods of price declines which is entirely unwarranted. This general retrenchment—for it affects a surprisingly large number of businesses—serves to aggravate the price decline itself as well as the general contraction in employment, wage rates, and business volumes.

A similar situation, of course, arises in times of rising prices. The existence of inventory profits leads to an unwarranted optimism.

Professor Graham of the University of Chicago, School of Business, tells of an early experience in the retail shoe business. This was during the World War. His employer was faced with sharp advances in the wholesale cost of shoes. He was determined not to profiteer, however, and decided not to advance retail prices to an unreasonable margin over cost. As a consequence, he continued to sell at $6.00 shoes he had bought at $4.00 per pair, even though his outlay to replace each pair of shoes had risen to $6.50.

The result is obvious. While the business continued to report normal profits on its books, the cost of maintaining inventories was so great that each pair of shoes sold meant an out-of-pocket loss of fifty cents in cash to buy another pair. All this without allowing anything at all to cover the costs of doing business.

Perhaps these were profitable operations, but they certainly put a heavy dent in the pocketbook, and probably made the store a borrower at the bank.

Here, again, the business cycle implications are clear. These apparent profits are almost purely imaginary so far as a business is concerned which must, in order to continue operations, maintain its operating inventories.

Perhaps it would be more accurate to say that these profits are in the nature of an unrealized capital gain. The original establishment of a business requires an initial investment in inventories. Speaking from the point of view of economics, as distinguished from accounting, the fluctuations in the value of a firm's basic stock of inventories is essentially similar to the fluctuating value of the firm's plant or other fixed property. At some time when prices are high the plant might be liquidated and show a handsome profit, but the firm would have to close down its business to do this. The same is true of the basic stock of inventories.

As long as the business continues to operate, the inventory stocks must be maintained. Advancing prices, which mean that all goods sold must be replaced at a greater outlay than was made for the materials actually involved in the sale, produce fictitious profits which are not cash profits.

Any attempt to use these profits for payment of dividends—or even for the payment of taxes (the revenue laws consider them taxable income)—overlooks the fact that they have already been used for the maintaining of inventories and are not cash profits at all.

It is easy to see how this situation can be an important reason why businesses in times of rising prices increase their borrowings at the banks. They want to spend their profits and have them tied up in inventories at the same time.

What really happens in most businesses when inventory profits are the basis for dividend declarations or for some form of business expansion is that money is borrowed for the purpose. But it is seldom realized that it is borrowed money, not profits, that is being spent. Moreover, the inventory profits which influence the decision to spend are insecure and open to the risk of price declines, which can completely cancel them. The debts, on the other hand, remain in the form of firm contracts, which can be reduced only by being paid off.

PROFITS FROM INVENTORY SPECULATION

In discussing inventory profits and losses it is natural to ask whether it is not possible to earn true, or cash, profits from speculative operations in inventories; that is, from buying more inventories than are needed at low prices and then actually liquidating them when prices are high.

The answer is that this is entirely possible for the individual business. When such a transaction is completed it would be possible, consistent with the discussion above, to contend that these are true profits just as realized capital gains are true profits to the individual receiving them.

But there are two other comments to be added. First, comparatively few business men have been able to do this successfully. Expanding business usually prevents the easy liquidation of inventories at the right time. So far as the needs of the business are concerned, most firms find that periods of low prices are times when the tendency is all in the direction of small inventories, while high prices have a habit of coming at a time when there is a need for expanding inventories rather than liquidating them.

This leads to the second point. So far as records of total inventories are available, the business system as a whole does not buy cheap and sell high. Inventories remain very large until prices have fallen a long distance from the peak. Someone in the business system must certainly be taking inventory losses that are fully as large—very likely larger—than the inventory gains that came with the preceding price advance.

And this is the thing that is important from a business cycle point of view. While the phenomenon of inventory gains and losses has many complicated aspects in the account books of individual businesses, its business cycle significance is pretty clear. The emphasis commonly placed upon inventory speculation and changing inventory holdings for individual firms gives way to a remarkably stable pattern for the business system as a whole.

Moreover, the degree of fluctuation (other than seasonal) in the

physical volume of inventories, of consumers' goods, at least, is relatively small compared with the total volume of such goods which are a part of the regular permanent stock of inventories. And on this vast permanent stock of goods, inventory gains and losses cannot be avoided so far as the whole economy is concerned.

WHAT CAN BE DONE ABOUT IT

Unlike most of the economic arrangements which have been considered unsatisfactory in our business system, there are indications that it would not require an imposing new alphabetical administration to do something toward correcting the serious effects of inventory gains and losses.

It has been pointed out that perhaps the biggest trouble is that businessmen fail to recognize the illusory nature of inventory gains and losses when they come. The fine profits which the books show in a period of rising prices are not only illusory, but they are distinctly temporary, so long as prices continue to move down as well as up.

If inventory profits could be eliminated from current income statements, by the theoretically simple device of regarding the basic investment in inventories as an item of permanent capital, then reported earnings would be much more stable than they now are. Not only would businesses be relieved of a source of profit and loss which is entirely outside their control, but stated earnings would then reflect much more reliably the actual cash earnings realized. The cost of goods sold would be based upon the replacement cost of those goods—not upon the cost at which raw materials happened to have been purchased at some time in the past. Businessmen would not be so inclined to expand fixed investment and inventory out of so-called profits if they were made to realize they were doing it out of borrowed money, rather than out of true profits. Dividends would not be distributed in the same way; presumably they would be much more stable.

These are all important business-cycle elements. So long as prices fluctuate with business conditions, and as long as businessmen are guided by results which reflect inventory gains and losses, business policies will almost without exception be influenced in the directions that will amplify cyclical swings.

There are several methods of accounting which will eliminate inventory profits and losses from reported earnings. The principal ones are the base-stock method, the last-in first-out method, and the inventory reserve method. These methods will not be described here but there is an ample literature explaining them.

There is beginning to be a recognition of the need for such a revision

of accounting methods on the part of businessmen, economists, accountants, and government officials. Several important trade associations and many eminent accountants are vigorously promoting such a change.

The last-in first-out method is recognized in the Revenue Act of 1938 as an acceptable method for determining taxable income under certain conditions and in certain industries. This provision, however, while it is a part of the law, was opposed by the Bureau of Internal Revenue, and it is so circumscribed with restrictions that it cannot be applied before the law is revised. The revision of the Federal revenue laws to permit the exclusion of unrealized inventory gains and losses from taxable net income would be one of the most constructive moves that could be made to promote business stability.

There are many problems in the field of inventory profits which are undoubtedly unsolved. The field is a promising area for truly fruitful research. But the recognition of the problem itself—which, after all, is half the battle—has reached a stage where those discussing it are no longer considered wild economic or accounting heretics.

Perhaps the title "Price Policies in the Business Cycle" should be changed so far as this paper is concerned to read "Price Cycles in Business Policies." In any event, there is convincing evidence in business records that the effects of price fluctuations upon inventory values is definitely a first-rate business-cycle factor. If price fluctuations could be prevented from producing fictitious inventory profits and losses, there would be much less concern over the part which business policies, relating to prices and to many other things as well, play in causing cyclical extremes.

CONCEPTS USED IN UNEMPLOYMENT SURVEYS*

By John N. Webb
Works Progress Administration

So much has been said and written about the difficulty of defining unemployment that it may properly be asked "How have the unemployment surveys and censuses of recent years been able to measure what is so hard to define?" A partial answer to this question is that a formal definition of unemployment is not an essential element in unemployment surveys. What is essential, however, is that the concepts which determine the final results provide a logical and comprehensive substitute for a formal definition of unemployment.

Not only is there an increasing demand for accurate measurement of unemployment, but more is expected of the measurements that are made. A few years ago a count of the number of persons out of work was considered an important contribution; today, a count is only one of the facts that must be determined. For example, public assistance programs want information on unemployment by families, cases, or households; moreover, these programs frequently require that a distinction be made between the unemployment of primary and secondary workers in the family group. New terms such as "employables," "unemployables," "reentrants," and "partly unemployed" attest the rapid development of specific types of information that are desired in addition to the total number of unemployed persons.

In view of the greater demands made of unemployment surveys today, it is appropriate to examine the adequacy of the basic concepts that have been used in surveys made during recent years. Periodic evaluation of past procedures and constant experimentation with new methods are essential to improved measures of unemployment.

More than 40 surveys of unemployment[1] made between the years 1929 and 1937 provide the factual background for the discussion of concepts presented here. Although these studies differ considerably as to coverage and method, they have one basic procedure in common. This procedure is the method by which the total population in the civil division studied—that is, the city, county, State, or nation—is divided into two groups, one to be included in the unemployment inquiry and the other to be excluded.

The use of a common procedure may not be immediately apparent from an examination of two surveys, one of which, for example, includes

* A paper presented in summary at the One-hundredth Annual Meeting of the American Statistical Association, Detroit, December 27, 1938.

[1] A complete list of the studies examined in connection with the article may be obtained in mimeograph form from the Division of Social Research, WPA.

all persons without regard to participation in economic activity, while the other one includes only "persons 18 years of age or over, except women not usually employed." "The Michigan Census of Population and Unemployment"[2] is an illustration of the first type of study, and the studies presented as "Unemployment in Buffalo"[3] illustrate the second type. Still another type of survey excludes even more of the total population than the Buffalo studies. In 1929 the Philadelphia survey of unemployment[4] listed the *number* of persons in the family who were usually employed, but enumerated the personal and economic characteristics only of those who were unemployed. This type of limitation was carried even farther in the direction of excluding all but a particular part of the population in the National Unemployment Census of November 1937[5] which sent a schedule to every household but required a report only from the unemployed or partly employed *worker* who was able to work and wanted work or more work.

These four surveys illustrate the range of population coverage that is found among the surveys examined. At one extreme every person in the family or household was enumerated; at the other extreme, only the unemployed or partly employed worker who was able to work and wanted work is included. The method common to all of the studies was that by which the total population was "sorted down" to the unemployed. When all persons are enumerated the sorting takes place after the field enumeration; when only part of the population is covered, the sorting takes place at the time of enumeration.

These sorting devices serve in place of a definition of unemployment in studies using the interview method of obtaining unemployment data. In effect, the concepts that underlie these devices become definitions of unemployment when the sequence of "sorters" in each survey is traced. Clearly, then, the validity of the results depends upon the soundness and efficiency of these concepts. Two considerations by which these sorter concepts may be judged are objectivity, and applicability to the determination of unemployment at a particular point in time.

The concepts used in separating the total population into subgroups

[2] Michigan State Emergency Welfare Relief Commission, Lansing, Michigan, 1935. For reports see First Series Nos. 1–10, inclusive.

[3] Croxton, Fred C., and Croxton, Frederick E., Special Bulletin No. 163, New York State Department of Labor; Croxton, Frederick E., and Croxton, Fred C., Special Bulletin No. 167, New York State Department of Labor; Croxton, Frederick E., Special Bulletins Nos. 172 and 179, New York State Department of Labor.

[4] Dewhurst, J. Frederic and Tupper, Ernest A. . . . *Social and Economic Character of Unemployment in Philadelphia* . . . University of Pennsylvania, Wharton School of Finance and Commerce. Industrial research department. June 1930.

[5] *Census of Partial Employment, Unemployment and Occupations: 1937*, Washington, D. C., 1938, Vols. I to III.

provide the first step in the determination of unemployment in field surveys. The sorter concepts used in the principal surveys of recent years are the familiar ones of "gainful worker," "ability to work," "wanting (willingness) to work," "age," and "seeking work." Varying combinations of these concepts were used in the several surveys. For instance, to be included in the unemployment returns of the survey reported as "The Incidence of Work Shortage in New Haven, 1931"[6] a person had to be a "gainful worker," over 14 years of age, "able to work," and "wanting work."

The relation of the sorting devices to the final determination of unemployment may be seen from the following illustration. In the Decennial Census of 1930 the sorter sequence that eventually determined unemployment began on the population schedule (Form 15-3b) in the form of an entry in column 25, of the "gainful occupation pursued . . . ; or 'none' (that is, no gainful occupation)" for *every person enumerated.* By means of this entry the total population was divided into two broad groups, gainful workers, and persons who were not gainful workers. There was no definite time factor involved; that is, the entry did not depend upon activity at any particular point of time or for any specified duration.

The next step in the sequence was also on the population schedule in the form of an entry (column 28) of "yes" or "no" to the question "Employment; whether actually at work yesterday (or the last regular working day)." At this point, a time factor came suddenly into operation, so suddenly in fact, that it required quite a bit of explanation to make it practicable in a variety of special situations encountered during the enumeration.

Having sorted the total population down into gainful workers and other persons, and then having sorted the gainful workers into those working and those not working, the unemployment inquiry was undertaken on a separate schedule (Form 15–95). Entries were to be made on the unemployment schedule only for those gainful workers on the population schedule who were not at work, that is, who answered "no" in column 28 of that schedule.

Since all quantitative surveys of unemployment use some sequence of sorters in determining the volume of unemployment, and since these sorter sequences serve in place of a definition of unemployment, it is appropriate to examine them in terms of objectivity and applicability to the determination of unemployment at a particular point in time.

Among the surveys examined, the gainful worker concept easily

[6] Hogg, Margaret H., *The Incidence of Work Shortage*, Russell Sage Foundation, New York, 1932.

ranks first in order of importance. Any person who has done gainful work satisfies the primary qualification for inclusion among gainful workers, though he may be excluded from the unemployment count on other grounds. The fact of gainful employment can, in most instances, be readily established; as a result there can be little question about the objectivity of this concept.

Despite this advantage, the gainful worker concept has some very obvious limitations, particularly during a period of prolonged depression. The one most frequently noted is its automatic exclusion of "new workers," i.e., inexperienced first job seekers, all of whom should be counted as unemployed in the labor market sense, and most of whom would be counted as unemployed in the needs sense.[7] This particular limitation of the gainful worker concept may be stated more broadly as follows: the total number of gainful workers available for employment at any one time is not the same as the total available labor supply at that time.

The size and membership of the total available labor supply varies with economic conditions. A household may have only one worker when the head of the household is working full-time, but may have two or more when the head loses his job, and the wife or children suddenly become active job seekers. Unless they find work, these temporary entrants into the labor market cannot be regarded as gainful workers.

In measuring unemployment, however, it is the total labor supply —entrants, reentrants, temporary as well as permanent participants —that must be examined; and this examination must refer to a specific point in time. Thus, while the gainful worker concept meets the requirement of objectivity, it is open to question on the requirement of applicability to the determination of unemployment at a particular point in time.

A growing realization of the limitations of the gainful worker concept as a base for measuring unemployment has led to placing greater reliance on the concepts of "able to work," and "willingness (wanting) to work." One or both of these concepts have frequently been used in connection with the gainful worker concept, so that the shift is largely one of emphasis. Ability to work and willingness to work are widely held to be logical and unambiguous tests that can readily be applied to the measurement of unemployment. The difficulty with these concepts lies in their lack of objectivity—just the reverse of the case with the gainful worker concept.

Just what does "ability to work" mean? In large part it means the

[7] It should be noted that in recent years most unemployment surveys make special provisions for including new workers.

absence of physical handicaps to employment; but how is a determination of this kind to be made in field surveys by the average enumerator except by taking the respondent's word in all but the most obvious cases of disability. Ability to work is a relative matter. When, for instance, does age become a handicap as real as the loss of an arm or a leg? Ask the unemployed miner of 55 years if he is able to work and the answer most likely will be "yes;" ask him why he lost his job and he is very likely to answer "too old." Ability to work, therefore, is not a fact that can be determined objectively in many important instances.

Ability to work is frequently paired with "wanting work" or with "willing to work" in such a way that an affirmative response to both is required to qualify the individual as eligible for the unemployment inquiry. In application, the "able" and "willing" concepts are subject to the same objection, i.e., they lack objectivity.

"Wanting work" or "willing to work" however the concept may be expressed, is again a relative matter that can be determined accurately only in the presence of an actual job offer. A large number of Mexicans in San Antonio, Texas are "willing to work" for the low wage of 4 to 5 cents an hour in the pecan shelling industry; a surprising number of youths—new entrants to the labor market—have been found willing to work for nothing in order to gain experience for lack of which they have been unsuccessful in their job seeking. On the other side, most highly skilled workers—machinists, carpenters, bricklayers, etc.—are willing to work only for a wage that contrasts sharply with the prevailing rate among unskilled workers. Moreover, "willing to work" is not only relative as between an individual and a particular job, it is also relative as between the individual and economic conditions. Thus, even if willingness to work could be tested by an actual job offer, the test would have to be highly variable.

Another objection to this concept is that it cannot be expressed in neutral terms for field inquiries. The prolonged discussion in the public press about whether the unemployed—particularly those on relief—would work if jobs were offered has so colored the words in which "wanting" and "willing" to work can be expressed that the question is "loaded" when asked.[8] A good illustration of this coloration is found in the oft repeated statement: "Anyone who really wants a job can find one."

The three concepts discussed up to this point have, in one combination or another, determined what part of the total population was eligible for an inquiry about unemployment. This is true despite the fact

[8] For an interesting discussion of the bias resulting from the use of "colored" terms in survey questions, see Spingarn, Jerome H., "These Public Opinion Polls," *Harpers Magazine*, December 1938.

that age limits have been used in most of the important surveys of recent years. Age, however, is less a concept of unemployment than a mechanical sorting device for excluding the very young and the very old who are considered to be outside the customary age range for economic activity.

There remains only one other concept—"seeking work"—that has been used to any extent in surveys of unemployment. Its use has been largely that of a secondary "sorter" applied to those who had previously passed the test of "usually works," "able to work," or "wanted work."[9]

It is difficult to see why the "seeking work" concept has not been more extensively used in unemployment surveys; not as a secondary sorter, but jointly with "working" as the best means of identifying the total labor supply. Like "working," "seeking work" is an activity that can be reported in terms of what the individual is doing at the time of inquiry. It does not depend upon a judgment by the respondent; and it can readily be phrased in neutral terms. Moreover, it meets the test of applicability in the determination of unemployment at a particular point in time more closely than any of the other concepts.

The best demonstration of an individual's ability and willingness to work is an active search for work, a fact that has been recognized in instructions to enumerators where it is sometimes suggested as a means of judging cases that offer difficulty of classification in terms of "ability" and "willingness" to work. In addition, an active search for work demonstrates availability for suitable employment as required by the eligibility rules of unemployment compensation systems. Unemployment determined by the seeking work concept is what the United States Employment Service reports by an inventory of its active files.[10]

Finally, unemployment measured by means of the "seeking work" concept distinguishes the unabsorbed portion of the active labor supply in the sense used by the economist in analyzing the supply of, and the demand for, workers. Thus, to objectivity and applicability there may be added the further advantage of uniformity of meaning with the theoretical approach to the problem of unemployment.

The advantages claimed for "seeking work" over the concepts used in most surveys made in recent years can be more fully appraised from an actual outline of an unemployment survey[11] which uses this concept

[9] "Actively seeking work" was one of the concepts used in the sample survey taken to check the results of the voluntary registration census of November 1937, which did not use this concept. See Dedrick, Calvert L., and Hansen, Morris H., *The Enumerative Check Census*, Vol. IV, of the final report of the National Unemployment Census, Washington, D. C., 1938.

[10] *Survey of Employment Service Information*, February 1938, United States Employment Service, Department of Labor, p. 1.

[11] The author wishes to acknowledge the assistance of his associates, particularly Katherine G. Parker and Gordon M. Murray, in the planning of this survey.

to determine unemployment. The remainder of this article is given over to a description of such a survey.

The survey to be described was formulated by the Division of Social Research, WPA, for use in an exploratory study of unemployment in selected urban areas, including some in which the long-time unemployed offer a particularly difficult problem of relief administration. In order to minimize the risk of error in departing from established procedures in unemployment surveys, a few basic rules were set up for guidance in planning the field schedule. The rules were:

> Every person in the unit of enumeration (the household) must be accounted for either in terms of participation in the labor market or in terms of the reason for nonparticipation. In other words, there must be no "pre-sorts" of the total population that is to be examined for unemployment.
>
> The objective tests of "working," and "not working but actively seeking work" must be used in a way that distinguishes sharply the active part of the labor supply at a particular point of time.
>
> At the same time the inactive part of the labor supply must be distinguished with sufficient clarity to permit combination with the active part for some analyses, and for comparison with other studies.
>
> The field schedule must not be unduly complicated or make more than ordinary demands upon the ability of the enumerator.

The number and arrangement of schedule questions that conform to these rules is by no means fixed. The number and arrangement outlined below is simply that which seemed best adapted to the needs of a particular inquiry. For convenience in discussion, the questions are arranged by sections as they appeared on the test schedule. The unit of enumeration was the household, and the time interval, one week.

The first section "A," is concerned with the personal characteristics of each member of the household.

Line No.	A. Personal characteristics						
	Name	Relationship to head	Age last birthday	Sex	Color and nativity	Marital status	Last school grade completed
	(1)	(2)	(3)	(4)	(5)	(6)	(7)

This section requires no comment other than that the questions are the standard ones found in most population studies, and that this section lists the total population for subsequent examination as to participation or nonparticipation in economic activity.

The way in which "working" and "seeking work" can be used to distinguish the active part of the labor supply, and at the same time dis-

tinguish the inactive part from the remainder of the population, is shown in section B.

B. Activity during census week of ..... through .....

Working (include persons assigned to WPA, NYA, and other Emergency Work Programs or CCC)						Not working but actively seeking work. (Give date this period of seeking work began)		Not working and not actively seeking work	
Occupation	Industry	Class of worker or program	Hours worked		Date job began			Reason for not actively seeking work	Date reason became effective
			Full time	Part time	Mo.	Yr.	Mo. Yr.		Mo. Yr.
(8)	(9)	(10)	(11)	(12)	(13)		(14)	(15)	(16)

(On the actual schedules, columns 8, 9, and 15 will be made much wider.)

The entries in section B distribute all members of the household into three groups depending on their activity during the census week. These groups are: persons actually at work during the census week who receive pay, profit, goods or services for their efforts, or who assist in the production of marketable goods without pay (i.e., unpaid family workers); persons not working but actively seeking work during the week; and persons who are not actively in the labor market during the week.

The first group—persons working—includes the employed in the sense of persons engaged in productive activity at some time during the week. The inclusion in this group of persons employed on emergency work programs such as the WPA, and persons engaged in unpaid family work, not only simplifies the definition of employment by making it depend on activity within a week, but also takes account of the fact that many emergency program and unpaid family workers consider themselves employed in the ordinary meaning of the term. The entry of type of worker or program[12] for each occupational and industrial entry identifies these workers and permits their segregation for purposes of analysis.

This method of handling entries of employment relieves the enumerator of the task of deciding what types of work constitute "employment" before making entries for persons working. The fact that emergency program and unpaid family workers are tabulated as separate groups in the working population allows the user of the returns to

[12] I.e., wage earner, employer, own account, unpaid family worker not seeking work for pay, unpaid family worker seeking work for pay, apprentices without pay and persons working for experience only, WPA, NYA, other emergency work programs, and CCC.

decide whether, for his purposes, they were to be considered as employed, unemployed, or as a special group.

In the second group—persons not working but actively seeking work—are included those workers who are unemployed in the strictest sense of the word, namely, persons without jobs of any kind who were actively seeking employment. For purposes of comparison with other studies it is a simple matter to add to this group the emergency program workers and persons whose reason (column 15) for not actively seeking work during the census week is that their separation from employment is of a temporary nature.

Persons not actively seeking work during the census week consist principally of individuals who are outside the labor market—children, students, housewives, retired workers, invalids, the physically incapacitated, etc. But it will also include and identify workers who do not fit readily into either the employed or the unemployed groups during the week of inquiry; this includes workers on strike, seasonal workers who are idle but are not seeking work, and workers who, being attached to industries (e.g., coal mining) which have stopped operations for an indefinite period of time, are not seeking work because they know none can be had.

These "in-between cases," which are neither employed nor unemployed in the ordinary sense, are troublesome far beyond their numerical importance. For example, there is the perennial problem of what entry should be made for the worker on layoff in a one-industry town where that industry has closed for an indefinite period of time. To report workers in this situation as employed because they would have a job if and when the industry reopened is to bring into question the meaning of the term "employed." The fact in this case and in many others is that the worker and the market for his services have become separated; and it seems logical to show this separation, particularly since it would disclose "stranded" workers within the total population.

A further advantage of recording the reason for not actively seeking work is that it rounds out a full report on the total population being studied. The entire group is classified according to one concept—labor market activity during a specific week. The total available labor supply is identified, and reasons are given to explain why some part of the population is not included in the available supply at the time of inquiry.

It would be possible to stop here and still obtain a good picture of employment, unemployment, and the distribution of the total population according to what they are doing at a particular point in time. It would not, however, be possible to obtain from so brief an inquiry,

much needed information on duration of unemployment from the last nonrelief job, the duration of the last job, the "usual occupation,"[13] and the length of time since the usual occupation was followed. A third section, therefore, has been added which although not essential to the determination of employment and unemployment, materially increases the amount of information obtained by the survey.

C. Activity prior to census week of									
Last full time private job of 2 weeks or longer					Usual occupation				
Occupation	Industry	Class of worker	Date job:		Occupation	Industry	Last job of 2 weeks or longer		
			Began	Ended			Date job:		Class of worker or program
			Mo. | Yr.	Mo. | Yr.			Began Mo. | Yr.	Ended Mo. | Yr.	
(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)

(On the actual schedules, columns 17, 18, 22, and 23 will be made much wider.)

In addition to extending the amount and the scope of the information obtained on employment and unemployment, section C achieves a needed simplicity by bringing together in one place information on the worker's past experience without in any way altering or complicating the determination of what he was doing at the time the inquiry was made. In a sense, section C is a supplement to section B, and allows the inquiry outlined in this paper to be used either in a "short form," i.e., sections A and B, or in a "long form," consisting of sections A, B and C.

Viewed as a supplementary inquiry, section C offers a compromise between the minimum of information required of unemployment surveys, and the much desired work-history record that is not feasible except on a very small scale.

In presenting this outline of a survey of unemployment, the main purpose has been to emphasize the objectivity of the inquiry from the point of view of field enumeration. The objectivity of this procedure arises out of the simple fact that it reports what the worker is *doing* within a particular unit of time. If a person is not working, he either is

[13] There is much variation in definition of what constitutes "usual occupation." The intent of this question is, in general, to find out what trade or profession the worker customarily follows. While it may have been easy at one time to obtain a clear-cut answer to this question, it is certainly no simple matter after 8 years of widespread unemployment. In the plan outlined above, the usual occupation has been defined as: "The occupation that the worker, in the light of his work experience and training, regards as his usual occupation."

or is not actively seeking work. To the question, then, "Are you actively seeking work?" the person need merely answer on the basis of his actual performance.

It is urged, then, that activity as a test for determining unemployment is not only simple of definition and of application to enumeration, but that it would also clarify the meaning of returns by relating them to the way in which the labor market does operate. And finally, its use would provide a basis for standardization of reports that is much needed at the present time.

DISCUSSION

The Department of Labor is vitally concerned that the Census of 1940 provide a much better basis than any previous census has provided for continuing statistics on employment and unemployment. To this end it is essential that more satisfactory definitions of employment and unemployment be adopted than those used in the Census of 1930. Experiments since then lead us to the conclusion that it is desirable to use a definition based wholly on "labor market activity" rather than one based in whole or in part on a more or less subjective opinion as to status. We are inclined to agree that the questions, "Are you actively seeking work?" and "If not, why not?" as proposed by Dr. Webb, constitute a satisfactory basis for such a definition. It will be important, however, to distinguish persons whose reasons for not seeking work are such as to indicate that they are in fact part of the unemployed labor force.

In one respect this classification should probably be modified. "Working" and "seeking work" are not mutually exclusive categories. There are a number of cases in which a person could quite properly report that he was both "working" and "actively seeking work." The most obvious case is the person who merely wants another job. He is clearly not unemployed, although he may be registered at a public employment office and therefore be included in the count made by the United States Employment Service from its active file. If, however, this person is working as an unpaid family worker, or is self-employed at a "stop-gap" job, his exclusion from the unemployed class may be much more questionable. It is important to have information as to the number of persons in this uncertain group. This could be accomplished by making the "working" and "seeking work" classifications independent.

The casual worker is in the same class. He does not want to *change* jobs, but since his "jobs" last only a day or two, "seeking work" is, for him, a normal activity. The important thing here is to distinguish (1) those who are seeking work in other fields, (2) those who worked so little that they can be regarded as virtually unemployed, and (3) those who worked part-time but were actively seeking more work. These classes can be distinguished if a question on "hours worked" is included on the schedule and if provision is made on the "seeking work" question for answers of "seeking *more* work" and "seeking *other* work."

It has already been suggested that the significant factors related to employment and unemployment are different for different classes of workers. It follows from this that an adequate classification by class of worker is essential. Different criteria of labor market activity are required for different classes of workers, and (perhaps even more important) an entirely different significance attaches to employment or unemployment in certain fields. For casual workers, employment does not have the definiteness that it has for most wage earners, while under certain conditions unpaid family workers and self-employed persons may be properly regarded as unemployed.

For Census purposes, some arbitrary definition of employment must, of course, be adopted. It will probably be necessary to consider a person employed if he worked at any time during a given week. Consider, however, the effect of applying this definition to casual workers such as longshoremen. In most ports, the organization of the labor market is such that most of those who are actively seeking this type of work will get *some* work each week. During the depression, the number of longshoremen actively seeking work probably increased. Seamen, unable to find jobs on vessels, sought longshore work. Because of the work-sharing arrangements which prevail in the longshore labor market, it is probable that the number actually working during any particular week also increased. In cases of this sort, the daily average number employed is more meaningful as a measure of employment than the number working at any time during a given week. For practical reasons, daily average figures cannot be obtained from a census tabulation, but if casual workers are clearly segregated in the census tabulations and publications, estimates of employment can be made later on the basis of data on hours worked.

The Bureau of Labor Statistics, like other agencies estimating monthly changes in total employment in the United States, uses data from the population census as a base for measuring the relative importance of different industries. The population census is the only source from which an overall picture of employment may be obtained. For those industries for which satisfactory industrial census data are available, the industrial censuses furnish a better base than do censuses of occupation figures. But in many fields there are no industrial census data, and no prospect of securing such data in the near future. For these fields reliance must be placed on the Census of Occupations. And if Census of Occupations data are to be used in this manner, it is essential that the industrial classification used be as nearly comparable as possible with that used in the various industrial censuses.

A clear-cut distinction between the classification by *occupation* and the classification by *industry* should be made in the editing and tabulation of census returns. The 1930 Census was rather seriously deficient in this respect. In part this was a result of inadequate basic data and in part of the editing and coding procedure. Certain occupations—for instance, telephone operators—were arbitrarily assigned to a single industry. Thus, even in the industry tabulations, a telephone operator in a business establishment or an

apartment house was classified in the telephone and telegraph industry. The result was that the census figures for operators alone exceeded the Bureau of Labor Statistics' estimate of the total employment in the industry, which was based on the industrial census.

Another essential is more complete tabulations by industry and more detailed publication of the results. The quasi-independent industrial classification which was possible in 1930, on the basis of the coding system adopted, was used in only two tables. It seems clear that the proper interpretation and analysis of Census of Occupations data for 1940 will require as a basis very much more detailed tabulations.

There are a number of additional problems in connection with the 1940 Population Census in which the Bureau of Labor Statistics is vitally interested. These include a more adequate occupational classification than was possible in 1930, provision for a cross-check between Census and Social Security statistics, and coordination between the Population Census and the various industrial censuses. Such coordination should go further than merely to establish comparability of classification. The Bureau would like to see a technique developed, somewhat along the lines now followed in the Census of Agriculture, by which the Population Census enumerator would secure a supplementary business schedule from persons reported as working on their own account.

But in urging that more complete information be secured on labor market activity, on class of worker, and on occupation and industry, the argument is not based solely on the ground that this information is needed for operating purposes. Only by securing such information can meaningful classifications as to employment and availability for employment be arrived at. This information is needed in order to give significance to any data which the Census collects on employment and unemployment.

The Census of 1940 furnishes us a great opportunity to extend our limited knowledge of employment, unemployment and the labor supply. In these circumstances, it is to be hoped that far-sighted plans can be made not only for the questions to be included in the initial enumeration, but also for an improved mechanism for the collection of the basic data, for the classifications to be used, and for the form of the final tabulations.

ARYNESS JOY
LORING WOOD

Bureau of Labor Statistics
U. S. Department of Labor

BIOSTATISTICAL PROBLEMS INVOLVED IN THE STANDARDIZATION OF LIQUID HOUSEHOLD INSECTICIDES[1]

By F. L. Campbell,[2] George W. Snedecor,[3] and W. A. Simanton[4]

Interstate commerce in insecticides, drugs and other chemicals that are intended to affect living organisms favorably or adversely is controlled by the Food and Drug Administration of the U. S. Department of Agriculture. The laws require that contents and performance of such products be truthfully stated on the label. Some products are not susceptible to accurate chemical analysis. Others are such that chemical analysis cannot be interpreted in terms of biological performance. In order to check on the performance of such products it is therefore necessary to test them against living organisms and to estimate their value by the effects produced. These so-called biological tests are made not only by law enforcement agencies but by reputable manufacturers who wish to maintain the quality of their products.

Biological tests are most necessary for the determination of the quality of liquid insecticides that are used for the control of household insect pests, such as houseflies, mosquitoes, bedbugs, cockroaches, etc. These insecticides consist of a more or less refined kerosene oil in which are dissolved materials extracted from certain plants, or certain synthetic organic compounds, or combinations of natural and synthetic compounds. To these materials a perfume may be added. The finished product is a dilute solution in oil of complex organic compounds which are difficult or impossible to evaluate chemically. The value of such liquids is determined by testing them against one of the species of insects that they are intended to control.

The method now used almost exclusively for this purpose is the outgrowth of a method published by Peet and Grady in 1928.[5] Having learned how to rear houseflies in large numbers in the laboratory throughout the year, they set up a 6 ft. cubical testing chamber within which houseflies were released and into which an insecticide was then sprayed, filling the chamber with a mist of oil. As the chamber was large enough to permit normal flight of the insects, practical conditions of application of the insecticide in a room were simulated and at the

[1] This is a combination of three papers and their discussion in a session of the annual meeting of the American Statistical Association in Detroit, 1938

[2] Associate Professor Entomology, Ohio State University

[3] Director Statistical Laboratory, Iowa State College

[4] Gulf Research and Development Company, Pittsburgh, Pennsylvania.

[5] C. H. Peet and A. G. Grady. *Journal of Economic Entomology*, 21: 598 (1928).

same time it was possible to control number of flies, dosage, exposure to the mist and environmental conditions. For their experimental use the method was satisfactory, but when it was adopted for the purpose of evaluating and controlling quality of finished sprays, it failed to yield concordant results among commercial laboratories that had installed Peet-Grady chambers.

For a time it was believed that if each laboratory should operate the method in exactly the same way under the same conditions the mean per cent mortality produced by a given insecticide in every laboratory would be practically the same. But cooperative tests of the same sample in different laboratories showed again and again an enormous variation in mean per cent mortality. Even in the same laboratory, successive tests on batches of flies from a single culture proved heterogeneous. Some typical results from one experiment are shown in Table 1. Clearly, the mortalities in the eight tests differ significantly among themselves in an erratic manner. The variations among cultures in the same laboratory, as well as from one laboratory to another, were even more striking.

One hopeful fact emerged from these otherwise embarrassing cooperative tests. It became obvious that proper evaluation of an insecticide could be attained only by comparing its effect with that of a standard insecticide. The results led promptly to the adoption of a standard which is used by all Peet-Grady laboratories in parallel tests with insecticides of unknown value.

TABLE 1
NUMBER OF FLIES AND PERCENTAGE MORTALITY IN EIGHT SUCCESSIVE TESTS WITH A STANDARD INSECTICIDE

Test	Number of flies	Number dead	Percentage
1	145	83	57.2
2	178	64	35.9
3	188	83	44.1
4	143	63	44.1
5	158	71	44.9
6	196	92	46.9
7	172	93	54.0
8	173	117	67.6
$\chi^2=46.4$		df = 7	$\chi^2_{.95}=24.3$

Some entomologists were not satisfied that variation in results within and between laboratories had been reduced to the lowest level consistent with efficient commercial operation of the Peet-Grady method. They set to work to study the influence of various mechanical and biological factors on variability of results. It had been known for several years that male houseflies were markedly more susceptible to certain sprays than female houseflies, but Murray[6] was the first to show that this difference in susceptibility was an important source of variation in the tests. Having exhausted other credible possibilities of varia-

[6] Christopher A. Murray. *Soap*, issue of August, 1937.

tion, he decided to resort to the tedious process of segregating the sexes among both the living and dead experimental flies. Some typical results are shown in Table 2. One is struck by the sex characteristics—the uniformity of the mortality for each as well as the difference between their susceptibilities. Other experiments confirmed these findings.

TABLE 2
MORTALITY OF MALE AND FEMALE FLIES IN 12 SUCCESSIVE TESTS FROM A SINGLE REARING CAGE

Males			Females		
Number	Dead	Percentage	Number	Dead	Percentage
57	40	70.2	52	6	11.5
58	44	75.8	49	5	10.2
61	42	68.9	53	5	9.4
54	33	61.1	45	4	8.9
48	39	81.2	76	8	10.5
59	38	64.4	75	5	6.7
59	40	67.8	60	4	6.7
47	32	68.1	59	8	13.6
55	35	63.6	82	9	11.0
44	29	65.9	83	5	6.0
31	19	61.3	71	2	2.8
41	29	70.7	78	3	3.8
614	420	68.4	783	64	8.2
$\chi^2=8.6$		P=0.66	$\chi^2=10.5$		P=0.48

After segregation of the sexes, successive tests from the same rearing cage revealed a very stable response to the insecticide. What then was the source of the previous difficulties? An examination of the numbers in the first and fourth columns of Table 2 suggests the reason. The males were predominant in the earlier tests, the females remaining in the rearing cage until driven out. The test of the significance of the changing probability of male and female representation in the successive samples is contained in Table 3. There can be little doubt that the variation exhibited in the sample reflects some non-uniformity in the sex emergence from the rearing cages. Furthermore, the linear regression of percentage on test number is highly significant.

TABLE 3
PERCENTAGES OF MALES IN THE 12 TESTS OF TABLE 2

Number of test, X	Number of flies	Number of males	Percentage, Y
1	109	57	52.3
2	107	58	54.2
3	114	61	53.5
4	99	54	54.5
5	124	48	38.7
6	134	59	44.0
7	119	59	49.6
8	106	47	44.3
9	137	55	40.1
10	127	44	34.6
11	102	31	30.4
12	119	41	34.4
	1,397	614	44.0
$\chi^2=36.5$		P<0.001	

Regression of percentage of males on test number: $Y=57.7-2.07\ X$

The question may be raised as to whether the combined mortality of the sexes in this experiment exhibits the variation encountered in Table 1. The data are shown in Table 4, together with the test of significance. There is small chance that the probability of death in the unsexed insects is uniform throughout the test. But with the refinement of the experimental technique not only did heterogeneity of mortality persist but along with it regression appeared. The percentages characteristically diminished in successive tests, as might be expected from the joint phenomena already discussed. Now, it is well known that percentage kills are related to susceptibility in a non-linear regression. Although no lack of linearity can be detected in the small sample of Table 4, it is theoretically desirable to use a rectifying transformation. For this, the normal deviates of the last column (designated "probits" by Bliss[7]) have been shown to be suitable. Their regression on tests is highly significant. The males are liberated first and are highly susceptible to the lethal spray. Later the females are driven out, but prove to be more resistant.

TABLE 4

MORTALITY OF COMBINED SEXES IN SERIES OF TESTS REPORTED IN TABLE 2

Number of test X	Number of flies	Number dead	Percentage	Normal deviate, Y
1	109	46	42.2	4.803
2	107	49	45.8	4.894
3	114	47	41.2	4.778
4	99	37	37.4	4.679
5	124	47	37.9	4.692
6	134	43	32.1	4.535
7	119	44	37.0	4.668
8	106	40	37.7	4.687
9	137	44	32.1	4.535
10	127	34	26.8	4.381
11	102	21	20.6	4.180
12	119	32	26.9	4.384
	1,397	484	34.6	
	$\chi^2 = 28.7$		$P = 0.0025$	
	$Y = 4.929 - 0.0504\ X$			

While Murray's findings were accepted in principle, his procedure of sexing the flies was so tedious as to be almost prohibitive in commercial work. This led Miller and Simanton[8] to seek some method that might employ test units having similar sex ratios. In the effort to devise such a method, it was evident that the normal sex ratio of flies would have to be investigated. On the basis of 18,440 flies representing eleven cultures picked at random over a period of six weeks, the mean percentages of males was 51.4, the maximum being 53.5 per cent and the minimum 49.6 per cent for any culture. Since these results indicate

[7] C. I. Bliss. *Annals of Applied Biology*, 22: 134 (1935).

[8] A. C. Miller and W. A. Simanton. *Soap*, May 1938 issue.

clearly the constancy of the sex ratio from culture to culture, it was at once apparent that if the normal sex ratio could be preserved, test units having sufficiently uniform sex ratios could be obtained. The observed tendency of the early portion of the culture emergence to be predominantly male indicated the necessity of using all of the flies of one culture or a representative portion thereof if the inherent sex ratio was to be carried over to the test units. To accomplish this the flies were divided into test groups while still in the pupal stage, for after

TABLE 5
UNIFORMITY OF SEX RATIO IN LARGE GROUP TEST UNITS FROM THE SAME CULTURE

Culture	No. of pupae drawn	No. males	Percentage males	Mean percentage	χ^2	P
N	528	266	50.5			
	538	266	49.5			
	550	269	49.0			
	528	242	45.8			
	519	271	52.3			
	518	268	51.7			
	521	262	50.2			
	559	280	50.1	49.8	5.64	0.60
L	538	274	51.0			
	513	259	50.5			
	528	258	48.8			
	540	272	50.4			
	514	243	47.3			
	498	231	46.4	49.0	3.63	0.60
K¹	529	280	52.9			
	526	268	50.9			
	521	253	48.6			
	568	282	49.6			
	573	282	49.2			
	535	280	52.3	50.5	3.34	0.70
V¹	561	263	46.8			
	546	266	48.7			
	557	298	53.5			
	517	263	50.9			
	515	257	49.9			
	509	243	47.7	49.6	6.28	0.25

the insects have reached the winged stage the male and female flies cannot be segregated in large numbers, nor can the sex ratio be readily controlled. Continued investigations proved that the insects could be separated easily from the rearing medium while in the capsule-like pupa stage without injury. By separating the pupae and drawing random samples of 500 from the culture population, test units having quite uniform sex ratios could readily be prepared. The data from four cultures, together with tests of significance, are presented in Table 5. It is clear that satisfactory control of the sex ratio in batches of 500 can be achieved by this procedure.

The adult flies may emerge from the pupae over a period of several days so that flies of different ages are present in the test units. This introduced the question of the relationship between age of the adult

flies and susceptibility to a spray. In the absence of data on this point, a study was undertaken by the investigators[9] to determine the reaction of flies of various ages to the same insecticide. It was found that flies at ages less than 3 days varied considerably in their reaction to the spray, while flies from 4 to 6 days old exhibited a fairly constant susceptibility. One of the interesting findings was the fact that flies less than 6 hours old were more easily paralyzed but less easily killed than older flies. With these very young flies, males and females responded identically to the spray. A difference in the susceptibility of the sexes was first observed when the flies were about 21 hours old and increased until flies were 2 days old, after which age the susceptibility of the sexes assumed a fairly uniform relationship.

For routine laboratory testing, it is convenient to use the flies at the earliest age consistent with uniform susceptibility. Therefore, it was considered desirable to have all flies in the test units between 4 and 6 days old at the time of spraying. It has been shown by Miller and Simanton that duration of the emergence period is related to the population density in the culture jars. By controlling the size of the culture populations, it was possible to obtain complete emergence within a 3-day period; thus, on the fifth day after peak emergence, all flies in the test units were 4, 5, or 6 days old.

With the sex-ratio and age factors successfully controlled by the use of test units prepared from random samples of the culture population other sources of variability hitherto obscured became evident. For example, Murray found that a digestion factor had some influence on fly susceptibility—apparently unfed flies are more susceptible than those fully nourished. This source of variability was corrected by keeping food in the cages until the flies were released into the testing chamber.

There remains, however, another important source of variability that improvement of the testing technique has not affected. This is the inherent susceptibility of the cultures. While the replicated tests on flies from one culture exhibit only the amount of variation expected in random sampling with uniform probability of death, the same insecticide may effect widely different mortalities from culture to culture. Also, the comparison of mortalities caused by two insecticides of different potencies tested on the same culture may change with culture.

These culture differences, which are present both within laboratories and between laboratories, may not prevent the setting up of satisfactory experiments for the comparison of samples of insecticides. Some

[9] W. A. Simanton and A. C. Miller. *Journal of Economic Entomology*, 30(6): 917 (1937).

evidence is found in Table 6, the analysis of variance of 50 tests made on each of two dosages. Two of the tests at each dosage involved flies from a single culture. The mean square for replications is appropriate for testing the significance of dosage-culture interaction. The latter being somewhat less than error indicates rather uniform differences between probit mortalities of the dosages in the several cultures. That is, although the probit mortality differs significantly from culture to culture, the difference in the lethal effects of the two dosages is stable and independent of the culture, the regression lines for the several cultures being sensibly parallel.

TABLE 6

ANALYSIS OF VARIANCE OF PROBIT MORTALITIES DUE TO TWO DOSAGES (100 mg. and 150 mg.) EACH APPLIED TO TWO BATCHES OF FLIES FROM EACH OF 25 CULTURES

Source of variation	Degrees of freedom	Mean square
Dosage	1	8.5206
Culture	24	0.1719
Dosage-culture interaction	24	0.0184
Replications	49	0.0204

One fundamental problem is to get experimental evidence that a sample of an insecticide of unknown potency is not less lethal than a specified standard. Suppose it is decided to test not only the sample but also the standard by means of two batches of flies from each of four cultures, 16 tests in all. The structure of the analysis of variance of probit mortalities is as follows:

Source of Variation	Degrees of Freedom
Sample vs. standard	1
Culture	3
Error	11
Total	15

If the sample is significantly greater than the standard, it might be certified as having at least the potency of the standard. Rules concerning the number of tests and the level of significance have not been formulated. It is clear that more than one sample may be standardized in one set of tests. The number depends on the number of batches of flies available from each culture, and a decision as to the relative number of tests to be made on standard and samples.

The official grading of insecticides in industry is at present limited to the region near the median lethal dosage where the regression of percentage mortality on dosage is sensibly linear. There is a tendency, however, to market insecticides prepared to effect higher kills. Grading

might be extended by either of two methods. (1) Dilutions of the standard and unknown preparations could be tested on flies from one culture or from each of several cultures. The statistical methods of Bliss[10] are then available. (2) As there is some doubt about the chemical and biological effects of dilutions of these insecticides, dilution could be obviated by adoption of a second standard insecticide prepared to kill a greater percentage of flies, say 80 per cent. Since it is

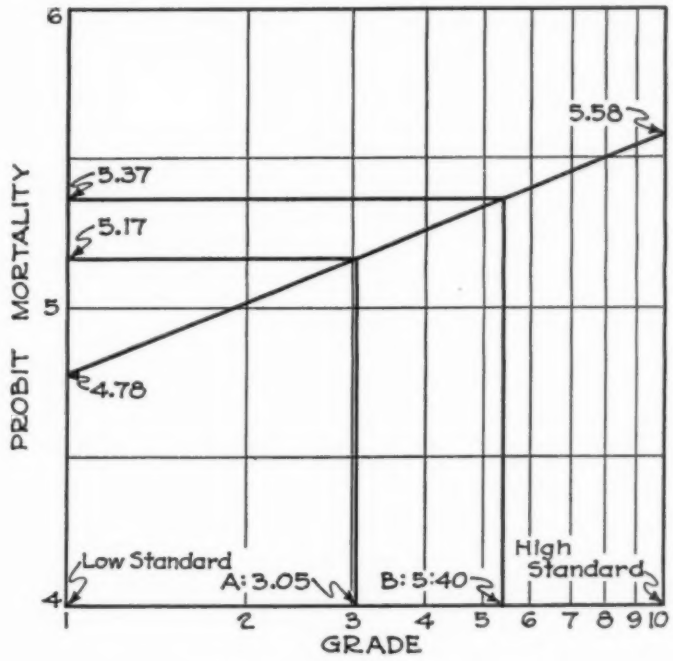

FIG. 1.—Graph for estimating grade from probit mortality.

known that some transformation of percentage mortality is necessary to rectify regression at higher kills, grading may be based on an appropriate function such as the normal deviate or probit. It may be found necessary, also, to transform the dosage scale to logarithms as when dilutions are tested.

A convenient scale for grading may be made by designating the lower standard as 1 and the higher as 10, intermediate grades to be measured on the arithmetic or logarithmic scale according to the system found suitable. Each standard and unknown sample is to be tested by one or more batches of flies from each culture used. Some hypo-

[10] C. I. Bliss. *Annals of Applied Biology*, 22: 307 (1935). Another paper now in preparation outlines other possibilities in grading with simplified tests of significance.

thetical results are set down in Table 7. In this table the percentages of flies killed have been transformed to probits. The grades for the unknown samples were read from a graph like Figure 1. The line drawn in the diagram corresponds to the first set of four tests in the table. The straight edge is aligned with probits 4.78 for the low standard and 5.58 for the high. The probit 5.17 for sample A is read on the base line as grade 3.05.

TABLE 7

HYPOTHETICAL DATA FROM SUGGESTED EXPERIMENT ON GRADING LIQUID INSECTICIDES

Culture	Probit mortality				Grade	
	Low standard	Sample A	Sample B	High standard	Sample A	Sample B
1	4.78	5.17	5.37	5.58	3.05	5.40
	4.86	5.20	5.47	5.66	2.68	5.75
2	5.00	5.35	5.70	6.00	2.12	5.05
	5.03	5.34	5.61	5.76	2.67	6.20
3	4.45	4.95	5.39	5.60	2.70	6.45
	4.63	4.90	5.06	5.20	2.98	5.78
Mean grade					2.70	5.77

As in the procedure for standardizing a sample, rules for grading will depend on investigations yet to be made. The logarithmic grading scale has been suggested from analogy with known facts about the potency of various concentrations of a single insecticide. For comparing different insecticides the arithmetic scale may be found appropriate. If the proposed method of grading proves feasible, its application can be simplified by the use of coordinate paper made with suitable scales. For example, a vertical scale similar to that on so-called "probability" paper would obviate the table of probits. Again, easily applied rules can be formulated for specification of the grade so that its value can be given within limits set to correspond with any desired level of probability.

AN INDEX OF 10 COMMODITIES, MONTHLY, 1815–60 IN THE NEW YORK CITY WHOLESALE MARKETS

By Warren F. Hickernell
New York City

The following monthly index of wholesale prices was compiled in 1917 to assist in the interpretation of the economic effects of credit crises during the period 1815–60. The data are taken from the *Shipping and Commercial List*, New York City, which revised its price quotations twice a week. The index, therefore, is sensitive to changes caused by money market conditions.

The occasion for constructing this index was the observation that historical writers are prone to ascribe prolonged price depressions to sensational crashes of the type featured on the front pages of the newspapers, whereas the most prolonged depressions have developed on account of other factors. For instance, there was a London banking crisis in 1818, but the major price decline during 1819–21 was due to an Act of Parliament in 1819 ordering the Bank of England to resume gold payments. The Panic of 1837 is featured in history books, but commodities declined only 15 per cent. Other factors caused the 50 per cent decline during 1839–43, such as the failure of the Bank of the United States and the grain shortage in England. The much publicized Panic of 1873 is sometimes mentioned as the cause of the price depression of 1877–78, whereas the pressure on prices was due to the Resumption Act of 1875. In every case, the serious work of economic interpretation begins after the newspaper reporters have finished their work of describing the crash stage of a crisis. Without statistical data, some transitory factor mentioned at the time of the crash may receive too much attention, while the relation of prices to the important gold-credit ratio will be ignored. The Index of 10 Commodities for 1815–60 will be found helpful in the interpretation of the effects of monetary developments during that little explored period. (This index was published in graph form in the author's *Financial and Business Forecasting*, Volume 1, pages 154, 223, 259 and 268. The table of actual monthly figures, presented here, was not included in the book.)

The specifications as to grades for the prices quoted by the "Shipping and Commercial List" are as follows: Cotton, middling upland, per pound; tobacco, Kentucky, per pound; sugar, New Orleans, per pound; beef, mess, per barrel; wheat, Genesee in 1860 and North River, northern, western and prime white in earlier years, per bushel; wool, common, per pound; leather, hemlock sole in the later and soal in the earlier years, per pound; rosin, common, per barrel; iron, British pig, per ton

AVERAGE PRICE PER ITEM OF A BILL OF 10 COMMODITIES*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
1815	—	—	—	—	108.0	118.8	125.3	123.5	122.6	126.7	131.4	126.9	122.9
1816	123.8	126.7	125.3	123.2	124.1	124.2	122.0	120.1	115.5	117.5	115.0	118.8	121.3
1817	122.0	122.9	122.8	119.3	123.3	117.3	119.5	113.7	111.5	112.0	113.3	117.6	117.8
1818	118.5	121.0	117.0	113.0	114.7	113.6	111.7	118.2	115.7	120.7	115.5	114.5	116.4
1819	111.2	108.7	107.3	101.3	92.4	89.9	85.7	84.1	87.2	90.1	86.9	92.2	94.7
1820	81.8	85.4	78.9	76.4	76.3	78.2	78.9	80.4	78.9	77.6	71.0	70.8	78.7
1821	68.9	69.4	67.1	65.6	70.1	73.1	72.8	77.3	79.4	79.3	81.1	79.1	74.4
1822	76.3	73.0	79.1	80.1	80.9	79.4	76.3	74.4	72.4	73.7	74.5	70.1	75.8
1823	73.7	70.5	72.0	70.2	71.9	72.0	77.9	77.5	75.8	78.3	77.0	75.5	74.3
1824	74.3	71.0	73.5	72.9	74.2	75.7	73.9	73.1	71.5	72.4	71.6	72.0	73.0
1825	70.3	73.1	74.1	81.8	88.5	89.4	87.6	84.9	81.4	81.1	76.4	76.5	80.3
1826	74.8	74.1	73.5	72.4	70.3	68.5	70.0	68.0	67.4	68.8	68.8	68.4	74.2
1827	66.3	65.3	64.8	66.7	67.0	65.9	65.7	66.1	65.1	66.2	65.9	66.8	65.9
1828	63.9	63.1	63.6	64.3	62.7	65.8	67.0	67.0	68.0	71.5	70.6	71.7	66.6
1829	72.9	70.9	70.7	69.8	69.2	69.7	66.5	64.4	64.1	63.5	63.9	64.1	67.4
1830	62.9	62.9	63.5	64.5	66.0	65.3	64.7	65.7	67.2	66.3	65.6	62.8	64.7
1831	64.8	63.4	63.6	64.4	64.4	63.2	61.9	62.7	62.6	63.1	62.5	63.0	63.3
1832	63.2	63.2	64.4	64.9	64.7	65.7	64.4	64.2	63.7	64.7	64.3	65.4	64.4
1833	63.9	62.9	63.9	64.6	66.3	67.2	67.2	74.0	75.3	74.8	71.9	70.3	62.9
1834	68.6	67.3	67.8	66.7	65.3	66.3	67.4	69.0	68.8	69.6	70.7	71.0	68.2
1835	72.3	71.6	73.5	75.6	77.3	78.3	81.8	81.2	81.3	82.2	79.7	79.2	77.8
1836	79.7	79.7	84.7	90.8	91.5	90.0	89.8	92.0	93.8	91.8	94.9	94.6	89.4
1837	93.7	94.3	94.8	90.8	85.8	83.0	80.0	81.3	79.4	80.1	83.1	85.3	85.9
1838	84.3	84.8	83.6	82.7	81.1	82.6	82.1	82.1	85.8	87.0	86.1	90.5	84.3
1839	90.9	94.5	96.0	94.5	95.5	92.1	89.1	85.1	84.1	81.9	81.2	80.6	88.4
1840	75.2	71.7	74.4	69.0	69.3	65.4	66.0	66.9	69.5	68.4	67.6	70.7	69.5
1841	70.0	67.6	67.1	66.2	66.9	65.4	67.5	66.5	67.6	66.2	63.4	63.6	66.5
1842	61.4	59.3	58.0	53.9	51.7	52.4	53.1	50.3	50.6	51.5	51.7	50.7	53.6
1843	48.4	46.4	45.9	48.8	51.7	51.7	53.3	49.8	51.3	49.5	50.3	52.1	49.9
1844	51.9	53.5	52.6	51.5	51.8	49.7	49.3	50.0	48.7	48.2	49.1	48.6	50.4
1845	47.3	47.1	48.6	53.3	56.1	53.5	55.7	58.1	58.5	55.9	58.4	61.0	54.4
1846	60.5	58.8	59.1	59.2	57.5	55.8	54.0	53.7	52.9	58.5	58.8	58.8	57.3
1847	58.0	67.3	67.5	67.2	69.9	73.5	70.1	65.8	67.0	67.2	62.3	59.4	66.1
1848	59.3	58.4	57.1	57.4	54.5	52.5	53.8	51.7	54.1	50.9	50.9	53.5	54.5
1849	55.2	57.8	60.0	59.2	59.3	56.7	58.9	60.0	62.1	61.6	60.3	60.1	59.2
1850	61.0	64.7	63.2	63.1	63.5	63.9	66.1	63.7	63.1	64.7	65.9	67.6	64.2
1851	69.9	69.5	68.0	68.2	67.4	63.4	62.3	60.6	60.3	59.5	56.3	56.0	63.4
1852	57.5	56.5	57.1	57.5	59.5	60.9	64.1	66.8	68.2	66.3	63.0	63.0	61.7
1853	69.6	73.1	71.6	68.9	71.4	69.0	68.0	70.3	70.4	72.7	73.4	76.2	71.2
1854	78.5	81.3	78.4	81.2	81.4	84.5	82.7	81.0	79.9	75.3	81.3	77.8	86.2
1855	76.5	76.9	78.7	81.4	85.9	88.9	87.5	84.9	85.9	85.6	86.5	84.8	83.6
1856	84.5	84.4	86.0	84.8	82.7	79.2	82.2	82.4	80.8	83.8	86.5	85.6	82.5
1857	92.1	93.0	96.6	97.7	100.8	101.6	101.3	98.1	93.3	89.4	87.4	87.4	94.3
1858	76.7	77.0	79.8	78.7	81.5	78.0	77.9	77.9	78.3	81.0	75.6	76.1	78.2
1859	73.6	79.6	79.6	78.1	77.5	74.7	72.6	74.1	70.5	67.5	69.0	68.3	73.7
1860	67.5	68.5	68.6	69.6	69.8	68.7	66.6	66.2	67.5	69.1	70.9	67.9	68.4

Note on Construction

* Monthly quotations were collected on the following list of commodities, the quotations for January, 1860, being shown for illustration:

Quantity	*Commodity*	*Market Value*
1,000 lb.	Cotton	$110.00
1,000 lb.	Tobacco	120.00
1,000 lb.	Sugar	80.00
10 bbl.	Beef	55.00
100 bu.	Wheat	150.00
100 lb.	Wool	40.00
100 lb.	Leather	22.00
10 bbl.	Rosin	30.00
1 ton	Iron	25.00
1 ton	Steel	43.00
	Total Market Value	$657.00

Average Market Value Per Item = $675/10 = $67.50.

of 2240 pounds; steel, British bars, per ton of 2240 pounds. All prices are quotations in the New York City markets the first week of the month.

In the work of selecting commodities, the author found only nine he desired, and in order to have the figure ten as a divisor, rosin was added as the tenth. Turpentine would have sufficed just as well, as both reflected the foreign trade influence in the ocean clipper age. Where a price range was given as the daily quotation (24–25, 38–40, etc.), the higher figure was taken. It sometimes happens that the daily "high and low" are the high of the best grade and the low of the worst grade. The author was not interested to take an average to reflect the bulk of sales. Cyclical oscillation was the point of interest, and the high was taken to satisfy the desire for uniform quality. Moreover, the high for a given day in each month is different from taking the high in a yearly range. The latter would be of no interest. But the trend of twelve monthly high figures has cyclical quality.

Interpretation of price oscillations.—The price rise in 1815 (108.0 to 131.4) was caused by the post-Waterloo scramble for British merchandise, assisted by the "fool's paradise" credit inflation in Pennsylvania. The post-war deflation was checked during 1816–18 by a "managed money" policy in London and Philadelphia. The new (second) Bank of the United States, opened in January, 1817, was never able to accumulate a normal gold reserve during these two years because excessive loans to stock speculators in Baltimore and to land speculators in the Ohio Valley churned more gold out than the stockholders put in. In 1817 the Bank of England permitted wild speculation in commodities and London bond dealers underwrote large amounts of Russian, Austrian and French securities. But the foreign drain on London's gold in 1818 caused criticism of the Bank of England and "managed money" soon came to an end. The British Parliament, in December, 1803, had voted to postpone resumption of gold payments until six months after ratification of a peace treaty. There were five postponements during the "managed money" period: To March, 1815; to July, 1816; to July, 1818; then to July, 1819 to ease the gold drain crisis of 1818, and finally the Act of 1819, which ordered resumption to proceed gradually by a schedule of increasing gold payments for paper money to take effect on February 1, 1820, October 1, 1820 and May 1, 1821. The pre-war valuation was fixed on the last date and maintained thereafter. This relentless progress toward the pre-war gold standard from 1819 to May 1, 1821 spelled a major decline in prices. Meanwhile, the speculators who had ravished the Bank of the United States were ousted early in 1819. The new management ruthlessly put the Bank on

a sound basis in ninety days by sharply decreasing loans. "The Bank was saved and the people were ruined," says Gouge. The return to a gold basis in America in 1819 caused the price index to drop from 121.0 in 1818 to 84.1 in 1819. The British resumption caused a further slump to 65.6 in 1821.

When gold resumption was accomplished on May 1, 1821 in London, the markets were oversold and inventories were depleted. A revival of buying caused the index to rally from 65.6 to 81.1. A month before Nicholas Biddle became president of the Bank of the United States in January, 1823, the index had relapsed to 70.1. The reserves of the Bank had risen from $2,000,000 to $7,000,000, the latter figure being a third of the total bank reserves of the country. From 1823 to 1834 Biddle kept the Bank on a sound and conservative basis and speculative cycles were not generated in the United States. But in England, Parliament released the Bank of England from a previous order to use certain gold accumulated to redeem some millions of bank notes, and the Bank proceeded to assist a speculative boom during 1823–25, dealers floating 260 million dollars of foreign loans and numerous stock issues. In 1825 this boom was topped off and halted by excessive commodity speculation, our index rising from 70.3 to 89.4 in five months. Meanwhile, Biddle refused speculative loans and invested the funds of the Bank of the United States in Federal bonds, so that the collapse of speculation in England in May, 1825 found America well entrenched to weather the storm.

The output of the gold mines did not keep pace with industrial production and the price index declined to 62.7 in 1828. In anticipation of higher tariff duties in 1828, imports were heavy and the index rose from 62.7 to 72.9 in eight months, Mr. Biddle increasing loans to importers. The index relapsed to 63.5 nine months later as the goods were liquidated.

The Bank of England was under fire from the Panic of 1825 to 1833, when its charter was renewed by Parliament after skeptical debate. During this period of "reform," speculation was dead in London and Philadelphia. Then the price index rose from 62.9 in February, 1833 to 94.9 in November, 1836, due to the reckless creation of credit money without a corresponding rise in the gold base. The inflation factors were:

1. The loans of the Bank of England rose from $21,000,000 in February, 1833 to $87,000,000 in February, 1837. The outstanding item was assistance to British houses engaged in trade with America.

2. There was a mania for incorporating joint-stock banks in Great Britain,—30 in 1833–35 and 42 in 1836. Numerous private banks be-

came branches of corporate banks. In 1836 the total was 119 corporate banks with 670 branches. Credit was being mobilized and newly created in forms never before present in Great Britain. England had new engines of inflation with no norms of experience to guide them. By 1836 British commercial credit to America was estimated at $100,000,000,—excessive in relation to American purchasing power.

3. In 1832 Andrew Jackson vetoed the bill to recharter the Bank of the United States, which thereupon liquidated its branches in 1833. This was followed by the creation of numerous State banks, which could inflate without the restraining influence of a central bank having a nation-wide control over credit and currency. Mr. Biddle secured a charter from Pennsylvania to operate the Bank of the United States as a State institution. The Bank of the United States lost its portfolio of Federal bonds when the Federal debt was retired in 1834–35. The country would have been much better off with a substantial Federal debt largely owned by the Bank of the United States, in view of what happened, for Biddle invested the funds of the Bank in railroad, mining and other stocks at high prices and in public lands in the Ohio valley. Its commercial loans were reduced, but this was not deflationary, as merchants increased their loans in England. Its stock loans to cashiers and other friends increased many millions. It had become an engine of inflation.

4. The total banks in the United States increased from 506 to 758 during 1834–36. Their loans rose 63 per cent, from $324,000,000 to $525,000,000. The Treasury had deposited $49,000,000 in 89 pet banks as of November 1, 1836. This Treasury money became tied up in speculative loans. Even the Treasury was a factor in the inflation of credit.

5. When Jackson demanded over $7,000,000 for the Treasury's holdings of stock in the Bank of the United States, Biddle sold the shares in London for more than he paid the Treasury. The bonds of Pennsylvania, Florida and other states were freely bought by foreign investors, who drew on their banks, thus sending gold to America. This aided American banks to expand credit.

The credit inflation in America, however, was out of proportion to the $9,000,000 of specie imported into the country in 1836. Credit became excessive in relation to gold, and commodity prices were overvalued in terms of the gold supply. In Wall Street, call money was 180 per cent in April, 1836; banks in Mobile resisted borrowers on cotton; Boston banks, in June, 1836, hastened to arrange emergency loans to merchants who had imported more goods than their customers could afford to buy. In July, 1836, the directors of the Bank of England became alarmed at the amount of gold which the Barings and others were

withdrawing for export to America. In August, the Bank announced that it would refuse to accept securities indorsed by eight British banks dealing in American paper. Stocks dropped in New York, but commodities held firm until the end of 1836 because of relief credit from the Bank of England. It loaned $7,000,000 to Manchester textile interests in November, 1836 and $30,000,000 to Liverpool houses in January, 1837. It shipped $10,000,000 of gold to the Bank of Ireland, selling bonds of European countries back to the Continent to obtain gold. Cotton remained at 20 cents a pound until the end of 1836.

The panic broke in America in March and April, 1837. A short wheat crop in 1836 caused America to import wheat from Europe, putting a strain upon the foreign exchange situation. Congress had ordered the Treasury to distribute surplus funds, about $37,000,000, among the states. In January and April, 1837 the states received $20,000,000 from the Treasury. Since the total coin in all banks was $37,000,000, the distribution of $20,000,000 caused a drain upon some of the 89 pet banks holding the Treasury balances. In March and April, 1837, there were 168 failures in New York with liabilities of $50,000,000. Manufacturing was at a standstill. Commodities dropped, the price index declining from 94.8 in March to 79.4 in September. The fact that the banks in America suspended gold payment checked the decline. At the current mint price for gold, commodities were still overvalued in relation to the gold supply. Mr. Biddle recognized this fact and sought to maintain the price structure by keeping the banks off the gold standard and pursuing a policy of "managed money."

By March, 1838 the Bank of England had reduced it loans to the 1833 level and its gold was up from $18,000,000 to $50,000,000. Several directors of the Bank engaged in selling American securities to British investors, including bonds of Mississippi and other states. Mr. Biddle sold shares of the Bank of the United States in London. He persuaded the banks in Alabama, Louisiana and Mississippi to remain off the gold standard when 700 banks in 22 states resumed gold payment in 1938, and meanwhile proceeded to corner the cotton market. He advanced the price of cotton from 9 cents in 1838 to 15 cents in 1839. Thus the joint efforts of the Bank of England and Mr. Biddle to mobilize credit raised the price index from 81.1 in May, 1838 to 96.0 in March, 1839. (Compare this situation with 1930–31, when the British Government and the New York banks were striving to bolster an excessive credit position.)

Short crops suddenly defeated the bankers in their efforts to boom business, and prices, with credit not properly based upon adequate gold reserves. Great Britain was forced to import $60,000,000 of wheat from

September, 1838 to December, 1839. The Bank of England borrowed $12,500,000 from the Bank of France and in Hamburg. But so much gold had to be exported to buy food that its gold dropped from $50,000,000 to $12,000,000. The Continent withdrew funds on deposit in London, fearing England would go off the gold standard. The flow of credit from England to America completely stopped. The gold drain continued, as England had to import 32,000,000 bushels of wheat during 1840–41, and this prevented the Bank of England from restoring its gold to a normal figure until the end of 1842. Meanwhile, the strain upon the United States was reflected in the fact that the country lost $8,700,000 of specie during 1839–41.

The cotton corner of the Bank of the United States collapsed at the first sign of trouble in 1839 and Mr. Biddle left the headship of the Bank of the United States after serving since January, 1823. The price index dropped from 96.0 in March, 1839 to 65.4 in June, 1840. Liquidation then halted until September, 1841. Then the combined effects of the failure of the Bank of the United States, the repudiation of debts by several states on account of low commodity prices and the deflation of the banks in the South which had remained off the gold standard during 1837–39 reduced the circulation of credit so conspicuously that a further slump in prices was in order, especially with the Bank of England under pressure during 1840–42. The price index, after stabilizing from June, 1840 to September, 1841, declined to 45.9 in March, 1843. At this level, the influence of speculative credit was washed out and commodities were no longer overvalued in relation to the supply of gold.

The annual production of the Siberian gold mines rose from $5,000,000 in 1840 to $15,000,000 in 1844. Bank reserves mounted sharply in 1843–44. California gold output increased from $8,000,000 in 1849 to $69,000,000 in 1853. Australian gold production was $3,000,000 in 1851 and $63,000,000 in 1853. There was more gold than the banks needed for reserves. Abundant private hoards developed. In 1837, total specie in the United States was $73,000,000, and only $35,000,000 or 48 per cent, was held outside bank reserves. In 1854, total specie was $241,000,000, and $181,000,000, or 75 per cent, was in private hands. After the panics of 1847 and 1857 the banks rebuilt their reserves quickly from private sources. No longer did prices drop back to the pre-panic levels. The price index rose from 45.9 in 1843 to 73.5 in 1847, and fell to 50.9 in 1848. It then rose to 101.6 in 1857 and dropped to 66.2 in 1860.

These oscillations were violent. Wild advances were to be expected with over-optimism begot by the conspicuous increase in gold produc-

tion. But proper weight was not given to the disappearance of gold from commercial channels, the metal being shipped to Asia, Africa and European countries which enjoyed large profits from commodity exports as prices rose. In due course, prices and bank loans became excessive in relation to the actual gold remaining in the possession of the banks, and violent reactions in prices were necesary to correct money market stringencies.

During the seven years 1849–55 the United States mint coined $402,000,000 of gold, but $262,000,000 was exported and little of the balance lodged in the banks. In the same period the French mint coined $350,000,000 of gold, but the Bank of France gained only $21,000,000 of gold and its holdings of silver dropped from $100,000,000 to $17,500,000. The silver went to the East. The decline in prices after the Panic of 1857 reduced the ability of countries exporting commodities to obtain gold, and the metal rapidly accumulated in the banks. The specie held by the central banks of England and France rose from $71,000,000 in October, 1857 to $215,000,000 twelve months later. In the same twelve months the specie in the banks of New York and New Orleans rose from $11,000,000 to $39,000,000.

During the fifteen years 1860–74, American mines produced $896,000,000 of gold and imports were $247,000,000, the total new supply being $1,143,000,000; but gold exports were $1,041,000,000. The net addition of gold within the country was only $102,000,000 while population gained 42 per cent, railroad mileage over 100 per cent and cotton and grain production nearly 100 per cent. Failure to keep the domestic gold supply in a proper relation to economic growth caused distress and political unrest until 1900, when Alaska and South Africa relieved the gold shortage.

THE STATISTICAL PRESENTATION OF THE EFFECTIVENESS OF INSTITUTIONAL TREATMENT*

By George B. Vold
University of Minnesota

It has long been said that the principal end and aim of all institutional penal treatment is the reformation of the criminal.[1] This means that some kind of change in the individual inmate must be brought about by the institution so that the offender will leave a different person than he was upon entry—that is, be a "reformed" individual. In a number of institutions elaborate case work programs have been set up for the diagnosis and treatment of offenders—a deliberate effort to plan for and facilitate this change or rehabilitation.

Now if it be true that the chief business of a prison is to change or "reform" the individual offender, then it would be natural to expect that institutional statistics should attempt to picture the changes taking place in the inmates under confinement. Present statistics do not do this and out of this fact grows the problem of the title of this paper. It is simply this, how can a prison administrator describe statistically in his annual report what the prison stay has done for and to the prisoner who leaves his institution? This paper will confine itself to a brief description of the inadequacy of present institutional statistics and will suggest the basis for a more adequate system together with a brief outline of more concrete proposals for the inauguration of such statistical reporting of the changes taking place in the inmates confined in penal institutions.

A vast mass of statistical information is produced every year by the penal institutions of the United States. Some of this is on a national scale, some of it is statewide, and much more is to be found in unorganized form in the numerous reports (published and unpublished) of individual institutions. The Census Bureau has sought to give unity and comparability on a national scale to part of this information. The last report, *Prisoners: 1936*[2] includes complete returns from all states except three (Alabama, Georgia, and Mississippi). Summary tables and detailed information are presented on the following: the conventional analysis of "movement of population;" "prisoners received" analyzed by offense, sentence, recidivism, race and nativity, age, and marital condition; "prisoners discharged" analyzed by method of dis-

* A paper read before the Section on Criminal Statistics of the American Prison Association meeting in St. Paul, Minnesota, in October, 1938.

[1] See "Declaration of Principles" of the famous Cincinnati Congress of 1870.

[2] Bureau of the Census, *Prisoners in State and Federal Prisons and Reformatories, 1936*. United States Government Printing Office, Washington, D.C., 1938 (83 pages).

charge, by offense, sentence, time served and relation between sentence and time served, race and sex; also a few miscellaneous items on such facts as the number of executions, sex and occupation of institutional personnel, etc. While this particular issue differs to some extent from the earlier ones in items included, the general form and content is very much the same. The various individual institutional reports, as well as those published on a statewide basis, repeat much of this information with a variety of additions. Thus the individual institutional reports frequently present statistics on appropriations, administrative costs, prison industry costs and productivity, details on the activity of the prison school, the hospital, and the prison farm, if there is one.

Discussion of the usefulness or purposes served by these statistics is not part of the present problem. Attention is merely directed to the fact that, despite their extent and variety, these statistics are all of one general type—they describe quantitatively the activity going on within the institution, or the condition or circumstances of the inmates at some given time during their stay in the institution. There is nothing to show change in condition during the stay in the institution. Instead one finds a variety of tables based on the entire population of the institution showing such things as the number of operations performed, pairs of glasses fitted, or number of inmates receiving treatment for venereal diseases, etc. The point I wish to make is not in disparagement of the usefulness or pertinancy of this information, but to emphasize that none of it throws any light upon changes taking place in the condition or circumstances of any individual inmate during the period of confinement. Unless information is at hand on changes taking place in the individual inmates during the period of confinement, no basis in fact can be found for any judgment of the effectiveness of institutional treatment.

Statistics on the circumstances or conditions of the inmates at a given time are useful and valuable in a description of the general criminal population and have their legitimate place in criminology, but they are valueless in showing changes taking place in the inmates themselves. Let us take a concrete example from the fairly typical *Report of the Minnesota State Prison* for the biennium 1933–1934.[3] Statistics are presented on "Education of Prisoners in Confinement" as follows:

The point to be emphasized for present purposes is merely that such information tells nothing about what happened to any inmate during

[3] Minnesota State Prison, *Twenty-eighth Biennial Report of the Minnesota State Prison for the Fiscal Years, 1933–1934*, Stillwater, Minnesota, 1934, p. 61.

EDUCATION OF PRISONERS IN CONFINEMENT[4]

	Confined June 30, 1932	Received	Discharged	Confined June 30, 1933	Received	Discharged	Confined June 30, 1934
Illiterate	68	33	28	73	31	26	78
Read only	1	0	1	0	0	0	0
Read and write	233	38	41	230	19	39	210
Common school	822	341	391	772	410	335	847
High school	180	110	76	214	142	95	261
College	39	11	11	39	7	15	31
University	6	7	2	11	3	6	8
Business college	14	0	2	12	0	0	12
Unascertained	0	1	0	1	1	0	2
Total	1363	541	552	1352	613	516	1449

imprisonment. It is interesting to note that there were 33 men classed as "illiterate" who entered the prison during the year 1932–33, but much more important in getting at the effectiveness of the treatment prescribed would be information on how many of these men, if any, were still illiterate upon discharge. Present statistics throw no light on what the prison has accomplished in dealing with these men. The same should be said of other tables and of other items descriptive of a static condition.

The Minnesota report is no worse and no better than many that I have examined. Statistics showing changes happening to the inmates within institutions simply are not being collected or published. Parole summaries, prepared for the guidance of parole boards in determining the question of possible parole, should present such statistics if any are in existence. Of the many hundreds of such records that I have examined in half a dozen states, none has had any statistical information on what has happened to the inmate during confinement. Verbal judgments recording some observer's opinion about such change are customary, but they are based on no quantitative information and do not reflect any statistical deductions or interpretations.

What kind of statistics are needed to show the changes that have taken place in the inmates during their period of incarceration? The first need is to establish an objective basis for judging what has happened to each individual. To do this there must be at least two measurements applied to the same individual of the same trait, one at the time of admission and the other, let us say, at discharge. There may, of course, be others at intermediate points in time, every six months, or every month, or some such arrangement—the essential condition is that there be more than one measurement of the traits or conditions

[4] From *Twenty-eight Biennial Report of the Minnesota State Prison, 1933–1934*, Published at the Prison, Stillwater, Minnesota, 1934, p. 61.

of the individual. When that has been done, it is a relatively simple matter to compare subsequent score values with earlier ones on the same trait or condition and thus judge by objective statistical processes what has happened to the individual inmate while in prison.

It must be emphasized that the tests and measurements given must be objective and standardized, and administered in such form as to permit repetition at a later date in order to show change in the condition of the individual inmate. For example, in determining the education of prisoners, as in the Stillwater report previously quoted, a battery of standardized educational achievement tests should be given and the correct grade level determined on this basis and not from the inmate's statement of school record, or even from the verified school record. With such objective tests of educational achievement given at the time of admission, it becomes a simple matter to check up on any advance made (or retrogression) during incarceration by repeating the tests in alternative form at the time of discharge. Statistical information in such form would record actual change of condition in the individual and would provide a sound objective basis for judging the effectiveness of institutional treatment in so far as school work is concerned.

Contrast such a statistical record of educational achievement with the system in general use. Institutional reports, that are more complete than the Stillwater table already quoted, usually show some part of or all of the following items: number of classes taught, number of inmates attending such classes and the number of meetings, number of teachers civilian and inmate, number taking correspondence courses, number enrolled for special activities such as debate and oratory, or music, and so on. Notice that in all this there is no record of what happens to inmates in these classes or other activities. If, however, classwork followed the giving of standardized achievement tests in each special field, then by suitable retesting at stated intervals actual progress or deterioration would be indicated as a matter of objective record and not merely as an estimate by an instructor.

Established case work programs in institutions usually pay attention to such questions as those of health, mental condition, educational levels, both academic and vocational, industrial skills and work habits, as well as the inmate's general social attitudes and interests. Classification clinics or case work units all attempt to survey these fields and arrive at some integrated judgment of a treatment program that will take into consideration any special conditions involved in each case. Discussion, opinions, and common sense judgments are the usual devices used for determining the needs of each particular case.

Such clinics would function on a much sounder basis of factual information if they could deal with the results of objectively recorded tests and measures in each of these several fields. Present reliance on subjective impressions, general estimates, and verbal reports are largely traditional and probably not as necessary as is generally assumed. The procedure outlined below would give a much sounder basis of statistical information for the classification clinic to deal with and would also make possible a factual presentation of the effectiveness of the treatment program.

The fundamental condition to which such a statistical program must be anchored is the objective measuring or testing of each field by means of standardized tests and measures that can be repeated at stated intervals. Let us briefly consider the application of such a program in each of the following fields:

Health and physical condition: Standardized physical and medical examinations have been worked out clinically and have been in general use for some time in many schools, industrial establishments, and in the army and navy. The same standardized type of examination should be given every inmate at time of admission and then repeated at a subsequent date, or at least, repeated before discharge. Direct comparison item by item, would indicate any important change in physical condition. A statistical problem remains to be worked out in connection with physical examinations. It is the devising of a satisfactory numerical index that will adequately summarize the individual's general physical condition. To the non-medical statistician this appears to be primarily a problem of the proper weighting of items determined by empirical experimentation.

Psychological and psychiatric condition: Objective, standardized scales are available for the determination of the level of intelligence and for testing the emotional adjustment of the individual. Reliability and validity scores in connection with the better scales in both fields are sufficiently high to make their application in retests a matter of practical usefulness. Such standardized scales should be given both at time of admission and at or before discharge, Comparison of the two test sessions would indicate any change.

Educational status: Well-standardized achievement tests are available for all subjects ordinarily taught in the public schools. The educational level of all inmates should be determined by this means at the time of admission, and retested from time to time to note any change.

Industrial skills and vocational education: A number of standardized tests are available of the principal vocational and industrial skills. Reliability in this field is not as high as for the academic subjects, but is

nevertheless sufficiently high to make the use of such tests a definite advance over the system of verbal reports alone. Comparison of results at time of discharge with scores at admission would again indicate change (within the range of error of the tests).

Interests and social attitudes: Many scales have been developed for the objective measurement of interests and attitudes. One research worker may prefer one scale, another will choose a different scale. So long as the scales used are reasonably well standardized and not designed for use with highly specialized or selected groups, any one can be used. It is important, however, that in retests either the same scale be used again or one with known score equivalents. It would seem wise to use available scales for the following: general social attitudes, current events and information, religious attitudes, and possibly also the measurement of political radicalism or conservatism.

In outlining this five-fold testing program as the basis for the statistical presentation of what happens to the individual inmate in prison, I have purposely refrained from mentioning or recommending specific scales or tests to be used. I have sought to avoid debate and quibbling about the merits of particular tests (Do the tests really measure what they are supposed to test?) in order to focus attention on the basic organization of a system of institutional statistics designed to reveal any actual changes taking place in the inmate while in the institution. If our institutional statistics are to show changes in the inmates, they must move in this direction. It is recognized, of course, that there are many alternatives to the five fields suggested and in some cases other combinations of fields would possibly be more satisfactory.

If a program of systematic tests and retests were inaugurated as outlined above, it would be a simple matter to draw up a statistical summary which would show quantitatively what changes had taken place in each case while in prison. An illustration of such a summary table in skeleton form follows. It is presented merely as a possible pattern with no thought that the form can not well be varied as particular needs may make necessary.

Experimentation with such a summary table showing changes in each measured trait or condition should make it possible to combine the various items into a single weighted score which would be an adequate and valid index indicating the individual's total net change. This index of change should be entered on the individual's record. It would give a numerical value making possible the direct comparison of one inmate with another from the standpoint of changes brought about while in the institution. In a sense this would be a rehabilitation index.

STATISTICAL SUMMARY OF THE EFFECTIVENESS OF INSTITUTIONAL TREATMENT
(For the Individual Record)

	Score at time of admission to institution	Score at time of discharge from institution	Difference in scores at admission and discharge (gain or loss)
Health and physical condition: (either index representing consolidated score for separate tests or the scores for the individual tests)			
Psychological and psychiatric condition:			
(a) Score on intelligence scale			
(b) Score on psychiatric questionnaire			
Educational status:			
(a) School subjects achievement tests (either single weighted score representing entire academic school record or scores from separate subjects or fields of study)			
Industrial and vocational skills:			
(a) Score on paper and pencil tests			
(b) Score on assembly and manual manipulation			
Interests and attitudes:			
(a) Score on social attitudes scale			
(b) Score on current events or general information and opinions scale			
(c) Score on religious attitudes scale			
(d) Score on scale of radicalism-conservatism			
Total: (weighted score indicating in single numerical index the individual's total net change)			

In order to show statistically something of the net effectiveness of an institution in its dealings with the inmates, it would be necessary only to consolidate and summarize these individual indexes of net change (rehabilitation indexes). The simplest statistical index of institutional effectiveness that comes to mind would be the ratio between the number of individuals in which the net change is favorable and the number in which it is unfavorable. More elaborate and more carefully weighted indexes could be worked out without any great difficulty.

Much of this discussion has of necessity been in the subjunctive mood because it has dealt with future probability and not with the established present. Existing statistics make no attempt to show changes taking place in the inmate under confinement. Yet there can be no other basis for judging the effectiveness of institutional treatment. Since there is no program in operation that might be made the basis for discussion, it has been necessary to outline not what is, but what ought to be. With several American penal institutions committed to relatively elaborate case work programs in attempts at treatment and rehabilitation, it is not asking too much to insist that the statistical reports of such institutions be brought into line with this work of re-

construction. The first essential is to organize the statistical program on the principle of trying to picture changes taking place in the inmate. This paper has sought to outline basic procedure. Most institutions with case work units in operation already have made basic observations. These need to be standardized and made a matter of systematic rechecks and retests. Then change may be pictured statistically.

Some will say that what has been said above is all good and well as academic theory, but that it is a program much too difficult and much too expensive to be of practical usefulness. To this we can only say that record keeping is always laborious, always takes much time, and always seems expensive. Yet it is the only way in which any enterprise can determine what it is doing. Penal institutions are no exception to this rule. At the present time they simply do not have any records from which to determine with any degree of accuracy what they are accomplishing. If the chief business of prisons is to change individual inmates by some program of penal treatment, then it is essential that the effectiveness of any given program be capable of statistical demonstration. This, in turn, becomes the central problem of institutional statistics.

It must not be expected that such a program can be carried out with but little effort, with no trained personnel, and without the assistance and cooperation of numerous specialists in many branches of scientific endeavor. It will take time and effort, and it will involve some expense, but it will also give an objective demonstration of the effectiveness of penal treatment. That is the statistical ideal which should be kept constantly to the fore as the goal of institutional statistics.

THE PURPOSE OF PAROLE STATISTICS*

By Harry Willbach
Division of Parole, Executive Department, New York State

Any business, organization or institution, regardless of the field in which it is engaged or of the nature of the units with which it is concerned, requires record keeping that can be of practical assistance in administration. This too is the immediate purpose of parole statistics. The statistical analyses necessary to administration in parole are:

1. The frequency of granting and withholding release on parole and the reasons for such action;
2. The nature and volume of both the intake and the outgo of cases;
3. The nature and number of contacts made by the staff;
4. The comparative results of the activity of the members of the supervisory staff as indicated by the successful or unsuccessful termination of parole.

In the field of social sciences there are other purposes of statistics which are equally important as those relating to administration. These are the evaluation of the results achieved. In outlining the purpose of these evaluation statistics it is necessary to focus attention on the objective of the activity so that the data secured may yield a measure of the realization or fulfillment of the objective. The objective of parole is both the protection of the community and the adjustment of the individual. The achievement of this double objective requires far more than the stern hand and the watchful eye of the policing authorities. It calls for the use of all the skills and forces that can be employed to aid the parolee in his adjustment to normal social situations.

The measurement of the protection of the community afforded by parole is secured by analyzing the outcome of parole. The successful termination of parole has been viewed as the parolee's strict compliance with all the conditions of parole imposed upon him as a guide for his conduct. It is held that all violations of these conditions, if not actually harmful to the community, are at least a threat to its welfare.

However, all deviations from socially approved conduct have not equal importance. It is neither fair to parole nor is it good scientific method to regard equally as failures the parolee who commits a murder, the parolee who is arrested for the violation of a traffic law or other local ordinance, and the parolee who, though able to do so, fails to provide adequately for his dependents. Certainly some acts are more serious than others either in their immediate effects or in their ultimate

* A paper read at the National Prison Congress, St. Paul, Minnesota, October 2, 1938.

consequences. It therefore becomes important to assign to each type of deviation a weight that indicates the relative degree of social nonconformance or social maladjustment.

In its goal of protecting the community parole makes use of the instrumentality of supervision. In practice this assumes different definitions. On the one hand it is a procedure which is equivalent to exile from the particular jurisdiction. On the other hand it may be a well integrated program of social case work. The former, which orders the prisoner to leave the confines of a certain geographical area, is at best a means of protecting only one particular community by compelling removal to any other community without consideration of the protection of the receiving community. The real protection of the community—society at large—rests upon the exercise and operation of a supervision which combines continual watchfulness with individual case work. Its aim is the strengthening, adjusting or changing of the traits and abilities of the parolee so that he shall conform to the social group with the minimum amount of friction. Perhaps the most fruitful field for research and for statistics in parole is the evaluation of different types of supervision as means of protecting the community. While this cannot be done now, it is possible that with the accumulation of experience there may emerge means of assisting in determining not only the pattern of supervision that can most adequately protect the community in a given case but also the particular form or method of this pattern.

The purpose of statistics in parole should not be to evaluate the effects of the entire penological process and then to ascribe the results—good or bad—to parole. Parole is not a thing or process unto itself. It is only one phase in the treatment of the convicted offender and it begins to function after the individual has been subjected to another phase—the penal institution. These two phases—the institution and parole—are mutually dependent and complimentary to each other. If the final objective of the sentence is to be achieved, each of these must exert a constructive influence on those exposed to it. Since incarceration precedes parole, the institution must shoulder its responsibility by preparing the prisoner for release.

The evaluation of the institutional treatment, though at present still a theory, presupposes the constant study of the prisoner so that his complete life history will be available. This should not be limited to the date on which the prisoner was received in the institution but must include the entire period of his incarceration. If this period is not included, it must be assumed that the institution had no effect on the individual and that the period spent therein represents a hiatus in his

life during which he remained in a Rip Van Winkle type of sleep from which he awoke only when released.

The prisoner does not live in a vacuum. He is a human being and as such has attitudes, emotions, abilities, social relationships and ethical concepts. These are continually modified and changed throughout the period of his incarceration. These changes must be watched, noted and studied.

It was the dream of many persons that classification units would insure this continued study. It was hoped that these units would not merely place inmates in categories but that they would suggest, follow and evaluate the treatment of the prisoner so that the period of incarceration might result in the preparation of the individual for normal social life. This hope still continues in spite of the fact that classification of this form is spoken of extensively but utilized only sparingly.

Taking a page from the writings of some of the early criminologists a comparison can be made with the field of medicine. The penal institution and parole stand towards each other in the same relationship as the hospital and clinic or physician giving treatment after the termination of the period of hospitalization. No physician would consent to treat a patient from a hospital without having available a complete history of the case. This would include detailed information about the patient at the time he entered the hospital and a record of the various measures taken while in the hospital together with the response of the patient to each. Parole expects a similar history and is entitled to it.

There must become available an evaluation of the effect of incarceration. Alongside this it will be our task to place an evaluation of parole for the same individual. Together, these evaluations will be the measure of attaining the ultimate objective—the protection of the community.

In the determination of the measure with which parole protects the community, thought must be given to the period of time for which parole must be held responsible for accomplishment or failure in this protection. There are two type of practice relative to the period of control which the parole authority has in individual cases. One of these requires that control and responsibility be maintained until the expiration of the entire period of time for which sentence was imposed. Accordingly, a person sentenced for a term of ten years, who is released on parole after spending five years in the institution must be continued on parole for the remaining five years. The other practice permits the parole authority to terminate its control and responsibility at any time it sees fit and give to the parolee a complete discharge at any time it chooses after he is released from the institution.

In the former case the length of the period of parole is the interval between the date of release from the institution and the termination of the full sentence. Due to varying sentences imposed by the courts, due to statutory limitations controlling the earliest time when release on parole may be granted and due to powers of parole authorities in selecting prisoners for release, the lengths of the periods of parole are variable. At one extreme there may be parolees over whom responsibility may be limited to months and perhaps weeks. At the other extreme are parolees over whom the responsibility of the parole authority continues for their entire lives.

It has been the practice in parole to give equal weight to all terminations regardless of the length of time for which the parolee was kept under supervision and therefore exposed to the influence of parole. A question must therefore be raised as to the validity of considering equally as successes a person whose parole was terminated one month after release and another person whose parole was terminated five, ten or fifteen years after release. The suggestion is therefore ventured that because of the variable periods of parole two different rates be prepared. In one of these there should be separate analyses of those persons having equal parole periods. The other rate requires a weighting of all parolees on the basis of supervision years.

However, even after this is done, the conclusions do not refer to the complete adjustment or reformation of the individual but only to his adjustment or rather conformity during the parole period. The Gluecks appreciated this inadequacy and have indicated that a more reliable evaluation goes beyond this limitation of time.

Whether or not it is the purpose of parole statistics to study the developments during the post-parole period will depend on the concept of parole as to whether its effects are limited in time or are continued as life patterns by the many individuals who have come under its influence.

The program set forth here represents a huge task and calls for clear thinking and much research. It has positive, constructive and useful objectives. The effort and time that are being expended in the field of prediction can with greater profit and more immediate gain be transferred to this program. There is no intention to minimize the thought provoking value of the early prediction studies as explorative and academic exercises. Why continue these academic exercises when the sole differences are in minor points of schedule or methodology? The only excuse for the continued studies in this field is that there is search for a refinement that can unfailingly predict the outcome of parole.

This is a far more ambitious objective than that of the life insurance actuary. It definitely implies the ability to foresee every possible experience that will enter a parolee's life and to foretell his reactions. It negates the concept of a human being as composed of interests, drives and emotions that are continually changing. It presumes to predict for a future date on the basis of the characteristics of a person at some past date.

Above all, these studies fail to take into account the effect of the supervision given the parolee, the influence of social, cultural and economic factors both at the time of release or peculiar to the community to which the prisoner is released and the statutory limitations under which the parole authority operates. The lack of exactitude and certainty of these tables is indicated by some statements made at previous congresses of this association.

Burgess when speaking at the Chicago Meeting said "the members of the Parole Board must use their own best judgment because the statement of parole expectancy does not serve its purpose if it is used too mechanically." The fact that this judgment can override the expectancy table exposes the entire process of selection to the self same judgment which the tables sought to eliminate.

In the same year Vold set before the students of prediction the nub of their problem when he said "It is frequently possible to show a high degree of accuracy in predicting for a group and yet miss the individual completely. Prediction in criminology . . . must be able to pick the particular individual." A year earlier Sanders in reporting on an attempt to use on one group of parolees a prediction table prepared from a different sample said he secured "rather disappointing results." Attention may then profitably leave the field of prediction and concentrate on some of the more immediate concerns.

The program set forth provides for the careful examination and the critical evaluation of parole by the reorganization and expansion of its statistics. The objective of parole being the protection of the community and the adjustment of the individual, attention is directed to the fact that failure to comply with conditions of parole is indicative of danger to the community and of the inability of the individual to adjust to society. However the conditions or regulations of parole are not all equally important. The measurement of the extent to which parole accomplishes its objective depends on assigning weights indicating the importance of transgressions of different conditions of parole. The entire field of supervision—its definition, its aims and its operative procedures—has not been subject to examination. This field requires

study for the determination of the value of the different patterns in protecting the community.

Fundamental to an evaluation of parole is definite information and an evaluation of the treatment given in the institution. The failure to furnish these is a serious handicap to the measurement of parole.

The period of parole varies as between different parolees. The variation makes it necessary to revise the method of computing rates of success or failure on the termination of parole. This revision calls for the assignment of weights so that the short parole period will not be given the same importance as the long parole period.

The primary difficulty in achieving the purposes here set forth is the fact that each parole system is a unit separate and distinct from every other parole system. There are wide diversities in the make-up of parole boards, in the powers given to these boards in determining the time and reason for granting parole, in the nature of the supervision exercised over parolees, in the length of the period during which supervisory responsibility is continued, in the adequacy of the staff both in number and in training, and in the reasons and powers for taking disciplinary measures upon the occurrence of parole violation.

Each parole board sets up the facts it wishes measured. The result is that there is a complete lack of uniformity both in the data collected and in the method of measurement. Several years ago Sellin undertook for the Bureau of Census the tremendous task of bringing together the experience of these numerous systems. He made a commendable step forward in securing somewhat similar information from the reporting agencies and laid the groundwork for evaluation. It is regrettable that this was not continued. It is only by repeatedly requesting certain items of information and by gradually extending and enlarging the items requested, that there will become available a body of knowledge that will be adequate for comparative analyses. From such analyses can come the helpful findings of research and the general improvement of parole.

There is urgent need for the Census Bureau, the American Parole Association, the American Prison Association, or some other body to embark on a program that will assemble statistics from many jurisdictions. The study of this accumulated data will yield conclusions that will aid in evaluating parole systems and thereby increase their efficiency and their usefulness. It has been done in other fields. It must be done in parole.

CLEARING VARIATES IN CONFLUENCE ANALYSIS*

By Horst Mendershausen
Cowles Commission for Research in Economics

In this paper I shall try to clarify some aspects of the relationship between statistical confluence analysis and the real processes which form its object. It seems to me that in carrying through a correlation or confluence analysis we must be conscious of this relationship in order to avoid meaningless results. The problem in analyzing a certain real process consists in finding a theoretical model which represents as closely as possible the important features, the skeleton of the real process. In the following I shall try to present a technique of setting up such models and to introduce a special type of variate: the clearing variate. Let me start with some general remarks on the aims of confluence analysis and on confluence and causation.

I. CONFLUENCE AND CAUSATION

Confluence analysis aims at detecting coefficients for hypothetically adopted relations between two or more observational variates. The term "confluence analysis" has been introduced by Ragnar Frisch.[1] In his view the aims of confluence analysis are to ascertain whether a given set of variates can be submitted to an analysis of their interaction, and to execute this analysis with a view to determining structural equations between the variates. While the first of these aims is specific for Frisch's approach, the second is also involved in the methods of "regression analysis" connected with the names of Karl Pearson, R. A. Fisher and others. In the following I shall use the term "confluence analysis" instead of "multiple regression analysis" because of its brevity and more appropriate suggestiveness.[2] The statistical methods hitherto developed under the two different headings appear to a high extent as cooperating approaches which will both have to be taken into account in further developments of correlation theory.

According to the nature of the hypothetically adopted relations, two different kinds of problems can be faced:

(1) The values of one variate—the dependent variate—shall be explained by a number of determining[3] variates (e.g., agricultural crops

* This paper was read before the Fourth Annual Research Conference of the Cowles Commission for Research in Economics, Colorado Springs, July 1938. In its preparation the author has had many valuable suggestions from Professor Ragnar Frisch, Oslo.

[1] R. Frisch: *Statistical Confluence Analysis by Means of Complete Regression Systems;* Oslo, 1934.

[2] Analysis of the way in which influences of different variates flow together in the determination of a dependent variate.

[3] The terms *dependent* and *determining*, as they are used here, refer to the real process analyzed, and not to the direction chosen for minimising deviations. The terms of a practical problem of statistical

by various weather factors, manure etc.). We may call this a *one way confluence analysis.*

(2) The numerical relations between a number of variates, none of which is considered as exclusively dependent on the others, shall be determined (e.g., correlation between cost of living, wage rates and total output). This may be called a *confluence analysis in general.*

In the first case, a causation system with a determinate direction is assumed; the investigator, drawing on the knowledge of the phenomena involved in the analysis, comes to assume that one variate (1) is caused by certain others (2, 3, $\cdots$, n); he terms the first the dependent variate (x_1), the others, determining variates ($x_2, x_3, \cdots, x_n$). The correlation between the variates is taken as a consequence of the causal influence of the determining variates on the dependent variate, and the set of structural coefficients as the measure of the strength of these different influences.

In the second case, there is no assumption on the direction within the causation system. The investigator assumes either that there is more than *one* direction or no direction at all. But it is assumed that the variates either act mutually on each other or that they have common causes, or finally that both of these situations are given at the same time.

The question considered in this paper is only relevant for the first kind of problem, viz., the explanation of a variate supposed to be causally dependent on other variates (cf. note 3).

The assumption of a one way causation can frequently be brought into harmony with the general interdependence of observable facts. We consider only a certain narrow section of the universe of nature and human society. In the universe general interdependence rules. But within a given section certain ways of causation can be neglected because they lie beyond its range and, therefore, are relatively unimportant. Let us take an example:

In a study of the correlation between incomes (i) and purchased quantities of milk (m) in working class families we may neglect the causation of i by m, since this way of causation must, according to economic theory, be much longer and much less important than the other one which goes from i to m.

The aim of a confluence analysis would be perfectly attained if a complete set of variates were found, that is to say if the values of the variates obeyed exactly a certain structural equation.[4] Practically

estimation may ask for minimizing in the direction of one of the determining variates, which thus becomes the "dependent" variate in a statistical sense. But very often *causally* dependent variates are treated also as *statistically* dependent.

[4] In this case the determinant value of the correlation matrix is 0.

speaking this ideal situation never occurs, but the investigator tries to approach it. Frequently this approach is marked by successive additions of determining variates and adjustments of the hypothetical set-up. Correlation analysis provides certain criteria for testing statistically whether the addition of a new variate to a given incomplete set may be considered as useful. A variate is taken as useful, if its inclusion brings the set nearer to the stage of a complete set.

The testing of the statistical usefulness of a determining variate has to take account of two groups of problems, one arising from the fact that the investigation deals with samples of populations, the other concerning the relations in the population itself. If a new variate is included in the set, one may test first whether it is useful under the assumption that no sampling problem exists, viz., that we have to do with finite population values. Such a test may be carried through by means of correlation coefficients. If the measure of correlation rises with the introduction of the new variate and if its improvement outweighs the loss of degrees of freedom, if finally there does not appear multicollinearity, the variate can be taken as useful.[5] There are, of course, still other assumptions at the basis of such a procedure, concerning the shape of the relationship, the applicability of the method of least squares etc. But on the whole, this part of the testing problem seems not too difficult. The consideration of the sampling aspect, however, leads to complicated questions because we generally know so little about the structure of the different variates.

In order to simplify the discussion I propose to deal only with problems arising in the correlation of finite population variates. I disregard all complications brought in by the fact that the parameters obtained in the usual confluence analysis are affected by sampling errors.

The fact alone that in a given confluence analysis a determining variate x_n may usefully be added to an incomplete set of $n-1$ variates, gives no information on the nature of the gap which is filled by the new variate. Even if we assume that there is no chance correlation in any pair of variates and further exclude by hypothesis any purely "symptomatical" correlation, we may be faced with *useful* variates which are *not causally connected* with the dependent variate.[6] Such a situation can not arise in an analysis of the relation between *two* variates. If the assumptions just made hold, a given amount of simple correlation can only be explained by direct causal connection between the two variates. In an analysis of the confluence of more than two vari-

[5] For multiple correlation coefficients—and indexes—see M. Ezekiel: *Methods of Correlation Analysis*, New York, 1930; for detecting multicollinearity: Frisch's book quoted above.

[6] In the case of a symptomatical correlation, two variates are correlated because they depend to a certain extent on common causes.

ates, however, there may be two different ways by which a determining variate (x_n) displays its useful action. x_n may be a *causally connected* variate or a *clearing* variate. Let us understand by a causally connected determining variate a variate which has a causal influence on the dependent one. A clearing variate, on the other hand, has no causal connection with the dependent variate but is, in a specific way, causally connected with one—or more—other determining variates. It will soon become clear what the specific way is and why the term "clearing variate" has been adopted. In order to facilitate the presentation I propose first to state the assumed relation between the *phenomena* the interaction of which we are trying to elucidate, on the one hand, and their *representation* by observational variates on the other hand.

II. OBSERVATIONAL AND BASIS VARIATES

I propose to conceive of this relation in the following way:

(1) The variations of the observational dependent variate (x_1) are due to variations of phenomena which we may call the *basis variates* ($y_1, y_2, \cdots, y_n$).[7] Assuming further a linear combination of the influences of the basis variates, we have

$$x_1 = \alpha_{11}y_1 + \alpha_{12}y_2 + \cdots + \alpha_{1n}y_n,$$

where the α's represent structural basis coefficients. All variates are taken as deviations from their—static or dynamic—means and expressed in units of their respective standard deviations. We assume that all variates x and y are effective—i.e., $\neq 0$ in at least two terms—and that all basis variates ($y_1, y_2, \cdots, y_n$) are uncorrelated. Let us further suppose that none of the structural basis coefficients equals either 0 or ∞:

$$0 < |\alpha| < \infty.$$

(2) The values of the observational determining variates ($x_2, x_3, \cdots, x_m$) depend equally on the values of certain basis variates. These basis variates may or may not be the same as those active in the determination of x_1, e.g.,

$$\text{(a)} \qquad \begin{aligned} x_1 &= \alpha_{11}y_1 + \alpha_{12}y_2 + \alpha_{13}y_3 + \cdots + \alpha_{1n}y_n, \\ x_2 &= \alpha_{21}y_1, \\ x_3 &= \alpha_{32}y_2 + \alpha_{33}y_3, \\ x_4 &= \alpha_{44}y_4 + \alpha_{4(n+1)}y_{n+1}, \\ &\cdots\cdots\cdots\cdots. \end{aligned}$$

[7] Here and in the following I speak of a basis variate as of a *homogeneous* factor. This is, however, only a simplification of the presentation. It makes no difference whether we consider a basis variate as homogeneous or as a complex of several factors. This remark applies particularly to the *disturbing* basis variates (see below).

In example (a) x_2 accounts for one basis variate of x_1, viz., y_1, x_3 for a certain combination of two, viz., y_2 and y_3, x_4 for one (y_4) plus another basis variate not active in the determination of x_1, viz., y_{n+1}.

III. SYSTEMATIC AND DISTURBING BASIS VARIATES

Let us call $y_1, y_2, \cdots, y_n$ the *systematic* basis variates. A systematic basis variate influences the values of the dependent as well as of one or more determining (observational) variates. On the other hand, let us call y_{n+1} a *disturbing* basis variate, or shortly a disturbance. A disturbance influences *either* the dependent *or* one or more of the determining variates, but not both of them. It is an extraneous influence within a given set. If a disturbance affects the *dependent* variate, it can only be eliminated by introducing into the set a new determining variate which represents the disturbance. Thus, the disturbance of the dependent variate in the smaller set becomes a systematic basis variate in the enlarged one. If a disturbance affects one or more of the *determining* variates, the problem consists in neutralizing its effect. This problem will be treated in the following sections.

IV. DISTURBED VARIATES AND CLEARING VARIATES

Let us now suppose that the student executing a multiple correlation analysis knows what kind of basis variates have to be taken into account in order to determine the values of the dependent variate. He will then look for a set of observational variates, each representing one of these basis variates (as x_2 in example (a)). This attempt will be favored if such observational values are available. But often enough—and especially in social and economic problems—such data are lacking. The basis variates may be found only combined among themselves (as in x_3) or disturbed (as in y_4), either by the nature of the problem at hand or by the deficiency of available statistics. The student will often be glad to find any observational variate at all which has something to do with the basis variate he is looking for, and he will be compelled to take it into account though it contains disturbances or undesired combinations of basis variates.

If observational variates of the kinds x_3 or x_4 have to be taken into account, the progress toward a complete set depends, however, on certain circumstances which may lie within the reach of the student's influence or not. Let us consider separately the two situations exemplified by x_3 and x_4.

(1) Improvement limited by the nature of the combination of useful basis variates within the new observational variate.

If we include in the set:

(b)
$$x_1 = \alpha_{11}y_1 + \alpha_{12}y_2 + \alpha_{13}y_3,$$
$$x_2 = \alpha_{21}y_1,$$

a third variate:

$$x_3 = \alpha_{32}y_2 + \alpha_{33}y_3,$$

the degree of the progress toward a complete set depends on the magnitude $[\alpha_{13}-(\alpha_{12}\alpha_{33})/\alpha_{32}]$, for

$$x_1 = \frac{\alpha_{11}}{\alpha_{21}}x_2 + \frac{\alpha_{12}}{\alpha_{32}}x_3 + \left(\alpha_{13} - \frac{\alpha_{12}\alpha_{33}}{\alpha_{32}}\right)y_3.$$

y_3 is so far an unknown basis variate and the 3-set x_1, x_2, x_3 is therefore only complete if $[\alpha_{13}-(\alpha_{12}\alpha_{33})/\alpha_{32}]$ happens to be 0.[8] The more this magnitude differs from 0, the more the 3-set will be kept away from becoming complete and the less precise will be our knowledge of the structural coefficients of x_2 and x_3. Thus, if there is no possibility of finding observational variates representing y_2 or y_3 separately, the success of the search for a complete set depends on the whims of the material. If, however, separate observations for y_2 or y_3 do exist, the difficulty can be overcome by introducing one of these causally connected variates into the set. If, for instance, we are able to introduce the variate $x_4=\alpha_{43}y_3$ into the 3-set (b), we can express x_1 as a function of the four observational variates:

$$x_1 = \frac{\alpha_{11}}{\alpha_{21}}x_2 + \frac{\alpha_{12}}{\alpha_{32}}x_3 + \frac{\alpha_{13}\alpha_{32} - \alpha_{12}\alpha_{33}}{\alpha_{32}\alpha_{43}}x_4$$

and obtain precise structural coefficients for x_2, x_3 and x_4.

(2) Improvement limited by disturbances contained in the new variate.

If we include in the 3-set

(c)
$$x_1 = \alpha_{11}y_1 + \alpha_{12}y_2 + \alpha_{14}y_4,$$
$$x_2 = \alpha_{21}y_1,$$
$$x_3 = \alpha_{32}y_2$$

a fourth variate:

$$x_4 = \alpha_{44}y_4 + \alpha_{45}y_5,$$

the degree of the progress toward a complete set depends on the magnitude $\alpha_{14}\alpha_{45}/\alpha_{44}$, for:

[8] Since we have assumed that none of the α's equals 0 or ∞, this condition coincides with the general mathematical condition for the dependence of m functions with n variates ($n \geqq m$), viz., that the Jacobian determinant equals 0.

$$x_1 = \frac{\alpha_{11}}{\alpha_{21}} x_2 + \frac{\alpha_{12}}{\alpha_{32}} x_3 + \frac{\alpha_{14}}{\alpha_{44}} x_4 - \frac{\alpha_{14}\alpha_{45}}{\alpha_{44}} y_5.$$

Under the assumption made above that for each $\alpha: 0 \gtreqless \alpha < \infty$, $\alpha_{14}\alpha_{45}/\alpha_{44}$ can not be 0. Since y_5 is an unknown basis variate, the 4-set x_1, x_2, x_3, x_4 cannot be complete. But the situation is not hopeless if we are able to neutralize y_5, that is to say to *clear* x_4 of the disturbing influence of y_5 by introducing a new observational variate $x_5 = \alpha_{55} y_5$. This will render the set complete:

$$x_1 = \frac{\alpha_{11}}{\alpha_{21}} x_2 + \frac{\alpha_{12}}{\alpha_{32}} x_3 + \frac{\alpha_{14}}{\alpha_{44}} x_4 - \frac{\alpha_{14}\alpha_{45}}{\alpha_{44}\alpha_{55}} x_5.$$

x_1 is a function of four known observational variates. The four α-ratios are the *structural observational coefficients.*[9]

The variate x_5 exemplifies the case of a clearing variate. *A clearing variate in the strict sense is a useful determining variate without causal connection with the dependent variate; its rôle in the set consists of clearing another determining (observational) variate of the effect of a disturbing basis variate.* The clearing variate can play this rôle because it is in causal connection with the disturbing basis variate contained in the disturbed observational variate.—In our example (c) x_4 is disturbed with respect to x_1 by the presence of y_5.

It is obvious that the interpretation of an equation of multiple relationship must be different according to the nature of the determining variates. It would, for instance, be erroneous to interpret the usefulness of a certain determining variate as a statistical verification of its causal connection with the dependent one if it is in fact a clearing variate. Let us take a simple example.

We wish to explain the volume of production of the manufacturing industries (x_1) of different districts of a country by the number of wage earners in these industries (y_1). We have values for the dependent variate (x_1) and assume that $x_1 = \alpha_{11} y_1$. We have, however, no observational variate expressing y_1, but only total numbers of wage earners in manufacturing industries and mines ($y_1 + y_2$).

$$x_2 = y_1 + y_2.$$

If y_2 is not a function of y_1, as is here assumed, x_1 and x_2 will not form a complete set; x_2 is disturbed by the basis variate y_2. Suppose now we

[9] We distinguish structural basis coefficients (α's) and structural observational coefficients (certain α ratios). In practice we know only the latter; we know them precisely in the case of a complete set. But even under these favorable circumstances we do not know the *basis* coefficients (α_{11}, α_{12}, etc.) except for the case when all the basis variates entering in the determining variates (x_3, x_5, etc.) have coefficients of $\alpha = 1$.

had data for the volume of production of mines (x_3) and could take this volume as a linear function of the number of occupied miners:

$$x_3 = \alpha_{32} y_2.$$

The introduction of x_3 will then render the set complete.

$$\text{(d)} \qquad \begin{aligned} x_1 &= \alpha_{11} y_1, \\ x_2 &= \alpha_{21} y_1 + \alpha_{22} y_2, \quad \text{(where } \alpha_{21} \text{ and } \alpha_{22} = 1\text{)} \\ x_3 &= \alpha_{32} y_2; \\ x_1 &= \alpha_{11} x_2 - (\alpha_{11}/\alpha_{32}) x_3. \end{aligned}$$

x_3 must be interpreted as a clearing variate for x_2; if our assumptions hold, it would be erroneous to conclude that we had verified a causal connection between x_1 and x_3. The result should be stated in the following way: the work of $x_2 = w$ wage earners in manufacturing industries and mines gives rise to a volume of production of $x_1 = \alpha_{11} w$ in the manufacturing industries if the volume of production of mines (x_3) is statistically kept constant. It has no meaning to state the result in the following way: viz., that a volume of production of the mines $x_3 = p$ gives rise to a volume of production of $x_1 = -(\alpha_{11}/\alpha_{32})\ p$ in the manufacturing industries if x_2 is statistically kept constant.

V. CRITERIA FOR CLEARING VARIATES

We have just considered a case where the investigator relying on his knowledge of the relationship and the variates at hand introduces a clearing variate into the set. This is one way by which the concept of clearing variates may prove its usefulness. There is still another way: the investigator may also be confronted with a given set of useful variates; he wishes to ascertain statistically whether all determining variates are connected with the dependent variate or whether one or several of them are not and may therefore be suspected to be clearing variates. In starting a confluence analysis we have to bear in mind that useful variates of this kind may be met with.

In both cases it appears desirable to have criteria for clearing variates. In the first, the problem consists of testing whether really—and if so, to what extent—the newly introduced variate proves to be a clearing one. In the second case, where the knowledge of the facts is supposed to be somewhat more defective, we wish to draw suggestions on the rôle of the different determining variates from the statistical analysis of their confluence.

The establishment of statistical criteria for clearing variates may, however, be hampered in different ways.

(1) Difficulties due to the complex nature of the observational variates.

A variate may be causally connected with the dependent variate as well as with a certain disturbing element in another determining variate, e.g.,

$$\begin{aligned} x_1 &= \alpha_{11}y_1 + \alpha_{12}y_2, \\ x_2 &= \alpha_{21}y_1 + \alpha_{23}y_3, \\ x_3 &= \alpha_{32}y_2 + \alpha_{33}y_3; \end{aligned} \tag{e}$$

$$x_1 = \frac{\alpha_{11}}{\alpha_{21}}x_2 + \frac{\alpha_{12}}{\alpha_{32}}x_3 - \left(\frac{\alpha_{11}\alpha_{23}}{\alpha_{21}} + \frac{\alpha_{12}\alpha_{33}}{\alpha_{32}}\right)y_3.$$

We consider here a special case, namely that where the set happens to be closed:

$$\alpha_{11}\alpha_{23}/\alpha_{21} + \alpha_{12}\alpha_{33}/\alpha_{32} = 0.^{10}$$

Both x_2 and x_3 act as clearing variates as well as causally with x_1 connected variates. The special condition under which this situation occurs will in practice only be realized by chance. If it is not, a situation arises with which we shall deal in the following section.

(2) Difficulties through the persistence of disturbances in one or more variates, so that the set can not be completed, e.g.,

$$\begin{aligned} x_1 &= \alpha_{11}y_1 + \alpha_{12}y_2, \\ x_2 &= \alpha_{21}y_1 + \alpha_{23}y_3 + \alpha_{24}y_4, \\ x_3 &= \alpha_{33}y_3 + \alpha_{35}y_5. \end{aligned} \tag{f}$$

The basis variates y_2, y_4 and y_5 must under these conditions be considered as disturbances which cannot be neutralized. Each of them may be taken as representing either some distinct phenomenon or a group of several phenomena. In reality, both kinds of disturbances arise. (We may recall our assumption that the various y's are uncorrelated.)

(A) If there is no obstruction of the types illustrated in the systems (*e*) and (*f*), if is not difficult to derive criteria for a clearing variate. (i) The introduction of such a variate will complete the set; (ii) the coefficient of simple correlation between the clearing variates and the dependent variates will equal 0; (iii) the clearing variate will show a certain amount of simple correlation with another determining variate

[10] If this condition happens to be fulfilled, the statistical behavior of the three observational variates does not suggest the presence of the disturbance y_3 in x_1 and x_2.—The remarks made above in note 8 apply equally to this case.

—the disturbed variate. The example (*d*) may be taken as a representation of such an ideal case.

(B) If there is an obstruction of type (*e*) and not of type (*f*) the necessary information may be drawn from the magnitudes of the observational structural coefficients α_{11}/α_{21} and α_{12}/α_{32} which we obtain from the confluence analysis.[11] In this case, we cannot look for criteria for the presence or absence of a clearing variate, but only for the comparative degree to which x_2 and x_3 work as variates causally connected with x_1 or as clearing variates.

(i) The introduction of x_2 in the 2-set x_1, x_3 or of x_3 in x_1, x_2 will produce a complete set. (ii) Both x_2 and x_3 will show a certain amount of simple correlation with x_1 as well as among themselves. (iii) x_2 will, to a higher degree than x_3, be a clearing variate if $|\alpha_{11}/\alpha_{21}| < |\alpha_{12}/\alpha_{32}|$; for under our assumption that

$$\alpha_{11}\alpha_{23}/\alpha_{21} + \alpha_{12}\alpha_{33}/\alpha_{32} = 0,$$

this means that $|\alpha_{23}| > |\alpha_{33}|$, i.e., that the observational variate x_2 is, to a higher degree than x_3, determined by y_3. If x_2 is to a higher degree than x_3 determined by y_3, it comes nearer to being a clearing variate than x_3 does, though it can never become a perfect one as long as α_{21} has a value different from 0 and the set remains complete. x_3, on the other hand, is, to a higher extent than x_2 causally connected with x_1. A quite symmetrical demonstration leads to the inverse results if $|\alpha_{12}/\alpha_{21}| > |\alpha_{12}/\alpha_{32}|$.

It may be said here that, in practice, the case of a determining variate being partly causally connected, partly clearing, is likely to occur frequently. Perhaps it will be found more often than a strict clearing variate. Quite a range of transitional stages is imaginable, characterized by a progressive replacement of the variance of the clearing element by that of the causally connected one

(C) Let us now start from the ideal situation (A) and introduce disturbances; what are the criteria of the clearing variates, e.g., of x_3 in the system (*f*)?

(i) The introduction of x_3 into the 2-set x_1, x_2 will not lead to a complete set but to an improved one if $|\alpha_{33}| > |\alpha_{35}|$.—If the latter condition does not hold, we are introducing more disturbing than systematic variance into the set. Then, we may either disregard x_3 or look for a new observational variate connected with its disturbancy y_5.

(ii) x_3 will show 0-correlation with the dependent variate x_1 taken alone and (iii) a certain amount of correlation with x_2—the more, the greater the share of y_3 is in both x_3 and x_2.

[11] We suppose here that the special assumption on the coefficient of y_4 happens to hold. If it does not, the problem of this system belongs to (C).

We may also start from the complicated case discussed under (B) and exemplified by the system (*e*) and allow $(\alpha_{11}\alpha_{23}/\alpha_{21})+(\alpha_{12}\alpha_{33}/\alpha_{32})$ to become $\neq 0$. Then, the disturbance y_3 does not happen to be eliminated "automatically." If we try now to ascertain which one of the variates x_2 and x_3 comes nearer to be a clearing variate, we find ourselves confronted with unsurmountable difficulties. We will find that both x_2 and x_3 improve the set without rendering it complete; each pair of the present observational variates will show a certain degree of correlation. The relative degree to which x_2 and x_3 appear as clearing variates cannot be ascertained from this set of variates alone.

These criteria may be considered as a first approximation to tests for clearing variates or at least for the relative degree to which a variate acts as such. They are, however, not comprehensive enough to meet all practically possible situations. The mixed causal and clearing variate deserves further analysis. Clearing variates of different "degrees" may also be envisaged, a problem which will be taken up in the next paragraph. But even if a complete apparatus of tests can be established which holds for the relations between population values, the theoretical development cannot stop here. The fact that in practical confluence analyses we are dealing with samples of a certain magnitude and nature has then to be taken into account. Consequently chance correlations between causally non-connected variates may appear. This renders difficult a statistical distinction between a clearing variate and a causally connected one, especially if the variate in question has comparatively little import for the explanation of the dependent variate. At any rate, however, a clearing variate should not show a sensible degree of correlation with the dependent variate.

In some cases it may be useful to apply the following plausibility test. Compute the equation of relationship between the disturbed (determining) variate and the clearing variate; subtract the influence of the latter from the values of the former; look finally whether the behavior of the resultant variate is consistent with assumptions which can be made on the *systematic component* of the disturbed variate.

It must be borne in mind that these statistical tests can only be used for verifying a certain theoretical set-up. Their results can never be taken as new information on the system of causation behind the analyzed material as long as they cannot be brought in harmony with general theoretical knowledge.

VI. CLEARING VARIATES OF DIFFERENT DEGREES

We have so far only considered clearing variates of the "first degree," i.e., variates which are clearing another determining one which itself

is causally connected with the dependent variate. We may as well imagine clearing variates of the "second or higher degree," necessary to clear disturbed *clearing* variates of the first degree, e.g.,

$$\text{(g)} \qquad \begin{aligned} x_1 &= \alpha_{11}y_1, \\ x_2 &= \alpha_{21}y_1 + \alpha_{22}y_2, \\ x_3 &= \alpha_{32}y_2 + \alpha_{33}y_3, \\ x_4 &= \alpha_{43}y_3. \end{aligned}$$

In this example x_3 is a clearing variate of the first degree; x_3 clears x_2 from the influence of its component y_3; but x_3 itself remains disturbed by y_3 as we do not add x_4, the clearing variate of the second degree.

The criteria for such a case as that exemplified by (g) may be obtained by an extention and modification of the criteria under (A).

(i) The introduction of the clearing variate of the first degree (x_3) will improve the 2-set x_1, x_2 if $|\alpha_{33}| > |\alpha_{34}|$;

(ii) it will show 0-correlation with x_1 and (iii) a certain amount of correlation with x_2.

The introduction of the clearing variate of the second degree (x_4) will (i) complete the set; (ii) x_4 will be correlated neither with x_1 nor with x_2, (iii) but only with the clearing variate of the first degree (x_3).

In a case containing no—or very small—disturbances and no complicated structural relation (action of one variate in different ways etc.), a *chain system of clearing variates* can be detected by means of these criteria.

VII. THE STRUCTURE OF THE DISTURBED VARIATES

Instead of being combined in an additive way the systematic part and the disturbance of a disturbed variate may be multiplied together or otherwise related. If something like this happens, the clearing variate cannot be introduced as a linear term and the whole structure of the structural equation must be revised. Sometimes a very simple procedure may be practicable: the disturbed variate and the clearing variate may be combined beforehand in a suitable way and introduced as one single variate into the confluence analysis.

$$\text{(h)} \qquad \begin{aligned} x_1 &= \alpha_{11}y_1, \\ x_2 &= \alpha_{21}y_1\alpha_{22}y_2, \\ x_3 &= \alpha_{32}y_2; \\ x_1 &= \frac{\alpha_{11}\alpha_{32}}{\alpha_{21}\alpha_{22}}\left(\frac{x_2}{x_3}\right). \end{aligned}$$

By introducing the combination (x_2/x_3) into the correlation we get a complete set.

It is important to analyze the structure of the disturbed variate as far as possible before trying to clear it in any particular way; by assuming an incorrect structure the investigator runs the risk of introducing fictitious disturbances into the set. If e.g., we were to assume erroneously that x_2 in our example (b) had the structure of x_2 in example (h), and consequently included the combination (x_2/x_3) into the correlation, we would not get a complete set but an expression for x_1 still containing the unknown y_2:

$$x_1 = [\alpha_{32}(x_2/x_3) - \alpha_{22}](\alpha_{11}/\alpha_{21})y_2.$$

The deviations between the actual x_1 and values computed by means of this erroneous procedure would only be a consequence of the incorrect set-up.

NOTES

THE NATURAL DECREASE OF POPULATION IN CERTAIN AMERICAN COMMUNITIES

It is difficult for many persons to realize not only the rapidity with which the birth rate is now declining, but also the very low level which it has reached in many parts of the nation. There is a tendency to regard persons who forecast a declining population in the near future as fomenters of a population scare. Regardless of whether it is preferable to have faith that human beings will always reproduce themselves because they have done so for many centuries or to believe that the only lower limit to the decline in the birth rate is zero and that the population is doomed to ultimately die out or to be absorbed by some more prolific people, it is desirable not to ignore the actual difference between the crude birth and death rates now existing in many American communities.

Various estimates of the intrinsic reproduction rate of the total population as well as that of the population living in different-sized communities have been published,[1] but until very recently it has been impossible to accurately estimate the crude rate of natural change of the population living in different sized communities due to the fact that births and deaths were not tabulated by residence in the published reports of the Bureau of the Census. Beginning with the records for 1935 the Bureau of the Census is tabulating total births and deaths by place of residence so that it is now possible to obtain fairly accurate crude rates of natural change for individual cities.

It should be remembered that the relative number of births and deaths in some communities is influenced by the presence of institutions, such as homes for the aged, whose population has a high death rate. Certain residential suburbs are inhabited largely by families with a small number of children while the population of other places is "abnormal" because of the special nature of the principal occupations carried on there.

The following data are for the years 1935 and 1936, the only years for which births and deaths tabulated by place of residence are now available. Although the crude birth and death rates for the smaller cities fluctuate rather widely from year to year, the birth and death rates for the two years combined for the total country are identical with the average rates for 1933–1937.

More deaths than births were registered in 1935–36 in 145 counties

[1] See especially *Population Index*, January 1938, pp. 60–63.

with a total population of 8,267,000 in 1930. Forty-two per cent of the population in these counties is in the Middle Atlantic States and 31 per cent lives in the three Pacific Coast States.

A rate of *natural decrease* was reported in 255 separate communities in 1935–36; the total population of these places in 1930 was 8,050,000 (Table I). Although more of these are in the Middle Atlantic and

TABLE I

NUMBER OF BIRTHS AND DEATHS IN COMMUNITIES WITH A RATE OF NATURAL DECREASE 1935–36, BY SIZE OF COMMUNITY AND GEOGRAPHIC REGION*

Region	Rural (less than 10,000 population)				Cities of 10,000–49,999 population			
	Births	Deaths	Number of places	Population in 1930 (000)	Births	Deaths	Number of places	Population in 1930 (000)
New England	6,324	6,829	6	232	8,159	10,597	15	334
Middle Atlantic	29,400	36,104	25	1,051	10,360	12,350	25	418
East North Central	21,639	24,353	25	783	6,190	8,685	13	224
West North Central	9,885	12,081	21	400	3,417	3,868	7	125
South Atlantic	5,849	7,373	11	171	2,838	3,522	6	90
East South Central	4,314	4,742	5	148	6,406	8,116	7	207
West South Central	2,736	3,130	4	86	1,901	2,238	4	58
Mountain	2,079	3,724	21	132	586	613	1	19
Pacific	17,355	22,246	28	724	6,360	7,682	12	259
United States	99,581	120,582	146	3,727	46,217	57,671	90	1,734

Region	Cities of 50,000–99,999 population				Cities of 100,000 or more population			
	Births	Deaths	Number of places	Population in 1930 (000)	Births	Deaths	Number of places	Population in 1930 (000)
New England	—	—	0	—	—	—	0	—
Middle Atlantic	5,365	6,333	3	219	3,386	3,470	1	127
East North Central	3,472	4,104	3	178	—	—	—	—
West North Central	2,171	2,668	1	81	—	—	—	—
South Atlantic	4,850	5,707	2	137	5,356	5,388	1	183
East South Central	1,580	1,834	1	65	—	—	—	—
West South Central	2,198	3,162	1	82	—	—	—	—
Mountain	—	—	0	—	—	—	0	—
Pacific	5,670	6,431	3	233	28,772	32,378	3	1,284
United States	25,306	30,239	14	995	37,514	41,236	5	1,594

* From *Vital Statistics-Special Reports*, Vols. 4, 6, 1936, 1937. Bureau of the Census. The 1936 data for a few states are preliminary.

Pacific Divisions than elsewhere, every geographic region is represented. New York with 16 out of 62 counties and California with 19 out of 58 counties reporting more deaths than births represent the areas of most widespread natural population decrease. Even the South, which has the highest birth rate of any major section of the nation, has several large cities reporting more deaths than births. The largest of these

are Richmond, Virginia, Columbia, South Carolina, Savannah, Georgia, Covington, Kentucky, and Little Rock, Arkansas.

Five of the 93 cities with 100,000 or more population in 1930 must now depend upon migration to maintain their population (Table II). More deaths than births were reported in Nevada for 3 of the 9 years from 1929–1937, although this may be the result in part of the incomplete registration of births. The total natural increase reported in Nevada from 1929–1937 was 804. All of the cities in Table II have very low net reproduction rates which strengthens the belief that their crude rates of natural decrease are real and not the result of unusual fluctuations.

TABLE II

NUMBER OF BIRTHS AND DEATHS IN TOTAL POPULATION FOR 1935–36, AND THE ESTIMATED NET REPRODUCTION RATE OF THE WHITE POPULATION IN 1930 FOR CITIES OF 50,000 OR MORE POPULATION IN 1930 WITH A CRUDE RATE OF NATURAL DECREASE 1935–36*

City	Births	Deaths	Net reproduction rate	City	Births	Deaths	Net reproduction rate
Cities of 100,000 or more population				Harrisburg	2,100	2,122	.71
				Cleveland Heights	295	783	.73
Albany	3,386	3,470	.73	Terre Haute	1,885	1,994	.74
Richmond	5,356	5,388	.66	St. Joseph	2,171	2,668	.64
Seattle	8,643	8,782	.61	Oak Park	1,292	1,327	.65
Oakland	6,827	7,176	.60	Columbia	1,749	2,451	.74
San Francisco	13,302	16,420	.46	Savannah	3,101	3,256	.76
Cities of 50,000–99,999 population				Covington	1,580	1,834	.90
				Little Rock	2,198	3,162	.58
				Glendale	1,267	1,437	.63
Troy	1,653	2,216	.67	Pasadena	1,636	2,139	.51
Atlantic City	1,612	1,995	.25	Sacramento	2,767	2,855	.65

* Net reproduction rate as computed by Dr. Bernard D. Karpinos, *Population Index*, pp. 60–63, January 1938. The net reproduction rate represents the average number of daughters which a female infant would bear if subject throughout her lifetime to a fixed set of fertility and mortality rates. The rates used were those prevailing in 1930. A net reproduction rate of 1.00 means that the population would remain stationary in number in the absence of migration, while a net reproduction rate of less than 1.00 means that a population would decrease in number in the absence of migration. For example, the rate of .73 for Albany means that 100 female infants, if subject throughout their lifetime to the fertility and mortality rates existing in 1930, would bear only 73 daughters.

It is thus apparent that an appreciable number of communities in all parts of the country will begin to decrease in population unless migration from other areas offsets the loss arising from the excess of deaths over births. Attention is called to these facts in order to convince even the most doubtful skeptic that the rate of growth of the population not only is slowing down but that it is also changing to a rate of decrease in many places. In view of widespread unemployment

this may, at first sight, be regarded as a boon. However, this is largely illusory since the present births will not be old enough to be either employed or unemployed for another twenty years. It is important to remember that the full effects of changes in the birth rate are not noticed until about a generation after they occur.

These data have been presented not in an attempt to create a population scare, but rather to call attention to a situation which will undoubtedly become more widespread in the near future. If hasty and ill-conceived proposals for the control of population change are to be avoided, it is important that the consequences of present trends in birth and death rates be anticipated long before the problem becomes acute enough for public action.

HAROLD F. DORN

United States Public Health Service

A CORRECTION

In "The Use of Ranks to Avoid the Assumption of Normality Implicit in the Analysis of Variance," this JOURNAL, 32 (1937), 675–701, the expression at the top of page 695 should be corrected by placing the denominator of the fraction under the square root sign, making it read

$$\frac{\chi_r^2 - (p-1)}{\sqrt{2\frac{n-1}{n}(p-1)}}$$

MILTON FRIEDMAN

NOTE ON PUNCHED CARD TECHNIQUE

Since the publication of my paper on "Punched Card Technique for the Correction of Bias in Sampling,"[1] it has been found that considerable economy can be effected by the use of summary cards.[2] The expansion factors are punched in the summary cards rather than in the original data cards. The resulting number of summary cards for the Texas motor vehicle study is less than ten per cent of the number of original data cards. Thus the machine hours required for the work of analysis are greatly reduced, and if, as in the Survey, it is necesary to take the cards to an automatic multiplying punch in an office of a tabulating machine company, this operation is greatly facilitated by the smaller number of cards. A further advantage is that sufficient blank columns can be provided to receive the products of variates by expansion factors to be punched by the automatic multiplying punch. While the sums of such products can be accumulated in a counter on the machine, there are advantages in having the products recorded on the summary cards for future reference. Should it prove impossible to preserve the great mass of original data cards, the essential information from these cards could be preserved in a much smaller set of summary cards containing both the unexpanded and expanded variates in a form convenient for use.

It was found that if the strata determined by the control variates, county, vehicle type, and year model, were further subdivided by population groups, the data cards would then be in groups which would remain intact under any of the various sorting operations required for the preparation of a great many of the desired tables. Furthermore, all of the cards of such a group, coming from the same stratum, would require the same expansion factor. For each such group of data cards, a summary card was prepared recording the control information (identical for all the cards of the group), as well as the number of data cards in the group and the totals of the various sampled variates. These summary cards were punched automatically by a summary punch actuated by the tabulating machine. Since the resulting summary cards did not provide sufficient blank columns for recording the expansion factors and the products from the automatic multiplying punch, it was found necessary to duplicate the information from each of these cards on two new summary cards. These cards were identical in control information, as well as in number of vehicles and amount of registration fees, while one of the cards recorded miles traveled and gasoline con-

[1] This JOURNAL, 33 (1938), 552–556.

[2] Considerable credit for the development of this summary card technique is due to Mr. W. L. as of the Bureau of Public Roads and to Mr. J. T. Barton and Mr. S. C. Bailey of the Survey.

sumed in the State and the other, total miles traveled and total gasoline consumed. This work was performed by the reproducing punch. Into each of these summary cards was punched the expansion factor appropriate to the stratum to which the card belongs, these factors being punched by the gang punch from master cards. The summary cards were passed through the multiplying punch in order to multiply each sampled variate by the expansion factor and record the product in a field provided for that purpose on the card. In a similar operation the expansion factor was multiplied by the number of data cards which the summary card represents to produce the expanded number of vehicles represented by that card. The total expanded value of a given variate was obtained by calculating on the tabulating machine the appropriate total of such products. A mean value of a given variate was calculated by dividing the total expanded value of that variate by the total expanded number of vehicles.

The success of this method requires the elimination at the outset of all the original data cards that are incomplete, or coded as unreported, in any of the control or sampled variates to appear on the summary cards. This elimination must be performed before the calculation of expansion factors. It is necessary, furthermore, that all the data cards represented by a single summary card require the same expansion factor.

While by this method it was possible to prepare all the expanded tables that were required, it must be noted that this technique has definite limitations. The summary cards can not be used to prepare any tabulation which would require the subdivision of groups of the original data cards represented by the summary cards. For this reason it is impossible to prepare frequency distributions of any of the sampled variates from the summary cards. Since it is thus impossible to calculate a mean from a frequency distribution prepared from these cards, it is necessary to employ a multiplying punch for the calculation of mean values of expanded variates.

C. W. VICKERY

Texas Highway Planning Survey
Austin, Texas

STATISTICAL NEWS AND NOTES

Central Statistical Board Report on the Returns Made by the Public to the Federal Government

The Central Statistical Board on December 31, 1938, submitted to the President a report on *Returns Made by the Public to the Federal Government.* In a letter dated May 16, 1938, to the Chairman of the Board, the President expressed concern over the large number of statistical reports required by Federal agencies from business and industry, and requested the Board to investigate various aspects of Federal reporting requirements. Accordingly, the Board undertook an extensive survey of the report forms distributed to the public by the several Federal agencies during the fiscal year 1938. The Board's report was transmitted to the Congress in January and was referred to the Committee on Finance in the Senate and the Committee on Expenditures in the Executive Departments in the House of Representatives. At the request of the President, Congress printed the report as House Document No. 27.

The Board divided returns of information supplied by the public to the Federal Government into two classes. Administrative returns were defined as those furnishing information to enable a Federal agency to apply a law or regulation directly to the respondent or to his employees. During the year July 1, 1937, to June 30, 1938, there were approximately ninety-seven and one-half million such administrative returns filed with the Government, including returns on income tax forms and reports to the regulatory agencies. Nonadministrative returns were defined as those used primarily for purposes of compiling statistical totals and to supply information for research purposes. Some thirty-eight million returns were classified as nonadministrative, including approximately twelve million returns collected by the 1937 Census of Unemployment. Under both definitions the figure excluded returns made to state governments and private statistical agencies. Fragmentary information obtained in the course of the Board's study indicates that the returns to such agencies were at least equal in number to those made to the Federal Government.

The material collected by the Board was analyzed to determine the extent and causes of duplications among the report forms used and the burdens imposed by them upon respondents. The Board was particularly concerned with two aspects of the problem: (1) the duplication of requests for data by different Federal agencies; (2) the diversity of business records which was necessary because of the variety of definitions used by the different Federal agencies.

The problem of duplication was approached through detailed examination of the report forms sent to selected classes of business enterprises last year with respect to requests for the respondent's total pay roll or number of employees, or both; and with respect to questions as to total gross operating revenue, total value of products or amount of sales. The results indicated

that considerable duplication in the sense of requirements in two or more sets of reports for "substantially equivalent" information, undoubtedly existed. Data on total pay roll or number of employees were requested from water carriers by eight different Federal agencies on twenty-one forms; from communications companies by five agencies on eighteen forms; from bituminous coal mining companies by five agencies on twelve forms; and from iron and steel manufacturers by four agencies on fourteen forms. Gross revenue or sales data were requested from electric power and gas companies by five agencies on eight forms; from iron and steel manufacturers by five agencies on six forms; and from banks by six agencies on nine forms.

Considerable duplication between the data obtained by the Federal Government and by State governments was also discovered. Because most States, as well as the Federal Government, tax income and participate in the social security program, employers must in many instances report the individual earnings of many of their employees four times for each reporting period. Because of these facts the Board suggests the desirability of a consolidated report of individual earnings to be used for income and social security taxes by both the Federal and State Governments.

The strict application of many laws and regulations requiring Federal agencies to collect data on a confidential basis was found to be a further cause of serious duplications in Federal reporting requirements. The Board's report points out that because of the necessity of keeping returns confidential it is frequently impossible for one Federal agency to secure, even for very general statistical purposes, data already collected by another. In many instances the effect of so-called confidential clauses has been to necessitate two or more requests for the same material by different agencies. The Board also points out that, under interpretations now made by some agencies of their confidential relations to respondents, information regarded by a Federal agency as "confidential" may be common knowledge in the trade. Interpretations of this kind have been carried to the extreme of preventing a Federal agency from disclosing the names and addresses of its respondents, and even from indicating, where totals for several classifications have been published, the classification in which any particular respondent has been placed. In effect, while this has permitted the exchange of statistical totals, it has prevented one agency from telling another agency what its totals mean.

Closely related to the problem of duplicate requests for information is that of the diversity of business records necessitated by slight variations in the definitions prescribed by different agencies engaged in collecting essentially the same data. In some instances, Federal agencies have failed to recognize current business practices in the formulation of questions to be included in report forms. In addition, report forms are sometimes out of line with the records of large groups of respondents because of a lack of agreement among the respondents themselves. Finally, conflicting reporting requirements sometimes rest upon definitions contained in basic legislation. "Wages and salaries" reported for income tax purposes are not the same as "wages and salaries" for purposes of social security taxation. Furthermore,

the definition of wages differs between two titles of the Social Security Act itself.

The Board's general conclusions may be summarized as follows: Most of the reports now made by the public to Federal agencies are essential to the regulatory or administrative functions of the Government or are necessary for the formulation of public policy or to meet legitimate public demand for information which cannot be collected either easily or adequately except by Government agencies. Although in most cases there is clear justification for the direct collection of data needed for proper performance of administrative or regulatory duties by the agencies concerned, in some cases the necessary information can be adequately secured through other Government agencies. To some extent, therefore, the requirements of the Government have imposed a burden which is unnecessary and which can be lightened. On the basis of its findings the Board made nine recommendations which constitute a program for improving the statistical services of the Federal Government:

1. That it be recognized as sound in principle and necessary in practice that the various statistical and report-collecting services of the Federal Government be for the most part attached to agencies having administrative or other responsibilities relating to the subjects of the reports; and that, because of this decentralization of the statistical and reporting services, it is essential that there be a statistical coordinating agency with adequate powers.
2. That provision in law be made to relieve any Federal agency or officer of any requirement under existing law directing the collection of reports from the public, if substantially equivalent information which will meet the needs of such agency or officer is available from other reports to any Federal agency.
3. That provision in law be made to promote and encourage Federal agencies collecting information on a confidential basis to make such information available for the use of other Federal agencies under rules designed to afford proper protection for the interests of individual respondents, these rules to be promulgated by the President upon recommendations of the statistical coordinating agency.
4. That in cases where the statistical coordinating agency is unable to reduce or eliminate unnecessary duplication in reports to Federal agencies, it be required to hold a hearing on the nature and reasons for such duplication and to report its findings to the President; and that the President be given power to eliminate such duplication.
5. That provision in law be made that, notwithstanding any previous provision of law to the contrary, no respondent shall be required to report information to a Federal agency when such information is obtainable from reports previously made to the same agency, unless the collecting agency shall have established before the statistical coordinating agency that the duplicate request is necessary.
6. That provision in law be made as follows: (a) that when the needs of two or more Federal agencies for reports pertaining to a given field of interest or from a given group of respondents can satisfactorily be met by the collection of such reports through a single agency serving as the agent of both or all such agencies; and when the statistical coordinating agency

after due investigation shall have found such an arrangement to be in the public interest, it shall, subject to approval of the President, provide for the collection of the reports involved by a single agency which it shall designate; (b) that after such a designation such arrangements shall apply to any new collection service within the field of interest or involving the group of respondents in question, unless the need for other arrangements is established before the statistical coordinating agency; and (c) that such arrangement shall be extended to reports now being collected, as soon as found practicable and in the public interest; provided that such arrangement shall not be allowed to hamper any agency in obtaining information needed in the performance of its duties.

7. That further consideration be given to technical changes in the Federal tax laws and procedures which would provide, in so far as is consistent with fiscal policy, for: (a) the consolidation of tax returns in cases in which any considerable group of persons is required to file two or more types of such returns in any one year; (b) acceptance by the Bureau of Internal Revenue, in lieu of all or part of any tax return, of any sworn report made to a regulatory agency which provides the required information; and (c) such other modifications in tax returns as would lighten the burden of making reports either to the tax authorities or to other Federal agencies.
8. That the statistical coordinating agency be directed to arrange for the establishment and maintenance of classified address lists of respondents so that for each important group of respondents there may be a standard list available to all Federal statistical and report-collecting agencies.
9. That Federal agencies be required by law to keep uniform records of all questionnaires and report forms adopted and used to collect information from the public and to make reports on their adoption and use to the statistical coordinating agency; and that responsibility in each agency for authorizing the use of such forms and for the maintenance of such records be centralized.

The first of these nine recommendations proposes the explicit adoption of the principle of decentralized organization of the Federal statistical services. The statistical functions of the various Federal agencies are so vitally related to their administrative functions that the organizational identification of statistics and administration is considered essential. Adoption of this principle necessarily involves the adoption of its corollary if duplication is to be prevented. In other words, coordination of the statistical and reporting services is necessary in order to compensate for the dispersion created by their decentralized organization. Recommendations 4, 6, 8, and 9 are designed to strengthen the present coordinating machinery. The remaining recommendations are designed to eliminate unnecessary duplication in reporting requirements.

Conference for the Fifth Revision of the International List of Causes of Death

The conference for revision of the *International List of Causes of Death* was held in Paris, October 3–8, 1938. The revision carried out by this con-

ference is the fifth in a decennial series which began when the International Institute of Statistics in 1893 proposed the original *International List* as a universal system for classifying causes of death. Since that time, acceptance has become so general that now practically every nation which publishes statistics on causes of death uses this *List* as a basis.

The recent conference was unusually successful in that a remarkable degree of cooperation and unanimity of feeling pervaded the deliberations. In fact, throughout the hundreds of decisions that were made, unanimous agreement was reached in all controversial questions by means of open discussion. The conference was attended by 46 delegates representing the following 15 nations and four independent agencies: Belgium (1), Canada (1), Denmark (4), France (10), Germany (2), Great Britain (7), Hungary (1), Italy (2), Netherlands (2), Norway (1), Paraguay (1), Roumania (1), Turkey (1), United States (7), Venezuela (1), International Labor Office (1), International Office of Public Hygiene (1), League of Nations (1), and Red Cross League (1).

The agenda for the conference was prepared by a Joint Committee of the International Institute of Statistics and the Health Organization of the League of Nations. This agenda presented a summary of the recommendations submitted by twenty-three nations and one independent agency. Recommendations submitted by the United States government were prepared by the American Public Health Association Committee on Accuracy of Certified Causes of Death under the chairmanship of Dr. Haven Emerson of Columbia University. The result of several years' work, these recommendations represented the considered suggestions and opinions of a wide variety of individuals, organizations, and professions in this country.

Measures adopted by the International Commission will bring the next edition of the *International List*, which is to be used during the decade 1940–1949, into closer conformity with modern medical science and public health practice. For instance, the group of titles relating to Infectious and Parasitic Diseases has been rearranged according to the type of organism causing the fatal disease, viz., bacteria, protozoa, spirochetes, filterable viruses, rickettsia, helminths, and fungi. Titles relating to rheumatic and cardiac conditions have been subdivided to provide statistics reflecting the importance of rheumatic fever as an etiological factor in deaths from cardiac affections. With increasing attention being directed toward the reduction of mortality among persons of adult age, such data should be important since prevention of deaths from rheumatic heart conditions depends to a great extent upon the diagnosis and treatment of rheumatic fever in the younger ages. It is important that deaths from cardiac affections be classified on an etiological basis since those involving valvular conditions may also be due to syphilis or arteriosclerosis.

Of particular interest is the classification adopted for maternal deaths, i.e., deaths due to conditions relating to pregnancy, childbirth, and the puerperal state. The new classification of such conditions aims to provide data in greater detail and more closely aligned with the needs of those responsible

for shaping preventive programs. Differing from the revision of 1929, rubrics for deaths resulting from the use of machinery and transportation vehicles have been brought into the body of the *List*, thereby making it compulsory for all nations adopting the *List* to tabulate such deaths in a uniform manner. The present edition of the *International List*, as adopted in 1929, does not require this, with the result that comparability among the various nations is often impossible.

The International Commission did not adopt a standard definition of stillbirth, since several of the nations represented at the conference in October, 1938, had previously committed themselves to the definition recommended by the League of Nations. However, the Commission did adopt a *Nomenclature of Causes of Stillbirth*, which should facilitate international comparison of stillbirth statistics among those nations having similar definitions of stillbirth.

The following resolution, which is both unique and highly opportune for the promotion of international accord in vital statistics, was unanimously adopted by the International Commission:

> WHEREAS, In 1929 the United States Government was delegated to study the problem of obtaining international consistency in the methods of selecting the primary cause of death;
>
> WHEREAS, Numerous studies, completed or in process, by several nations indicate that this is a serious and as yet unsolved problem; and
>
> WHEREAS, These studies indicate that the task of obtaining international comparability between the death rates of various diseases involves other questions than just those of selecting the primary cause of death. Therefore, be it
>
> *Resolved*, That: 1. The United States Government be thanked sincerely for the work it has undertaken; 2. The United States Government be requested by the International Commission to continue its studies during the next ten years in cooperation with other nations or agencies on a somewhat broader basis; and 3. For the purposes of such future studies, the United States Government be invited to form a sub-committee comprising representatives of countries and agencies cooperating in the various lines of research concerning this subject.

This resolution makes it possible for the United States Bureau of the Census to develop an international cooperative research plan for the solution of problems relating to the comparability of mortality statistics. It is contemplated that the membership of this committee be varied from time to time to permit representation according to changing research interests. This committee will make it possible for any nation to submit vital statistics research problems with the understanding that the nation itself contribute toward the solution of those problems. It is confidently expected that the measures adopted at the October conference will prove of no small value in promoting international cooperation and understanding in vital statistics.

HALBERT L. DUNN, M.D.

Division of Vital Statistics
Bureau of the Census

Progress of Work in the Census Bureau

Coordination of Functions of the Census and Foreign and Domestic Commerce. The recommendations of a committee appointed by the Secretary of Commerce to consider possible improvements in the current business statistical services of the Department will become effective in the near future. The Bureau of the Census will then be responsible for the collection, tabulation, and release of the basic tables on current statistics of retail and wholesale trade and manufacturing, while the Bureau of Foreign and Domestic Commerce will analyze and interpret these data and publish such interpretations. Previously each of the Bureaus has performed both functions in certain fields. This new arrangement does not affect the periodic industrial and business censuses, but applies only to business and industrial statistics gathered at intervals under one year. Current series now collected by the Bureau of the Census, or to be collected under the agreement, will be published by the Census with brief explanatory notes or definitions, but without interpretation or analysis. The staffs of the two Bureaus will work closely together on both the collection and analysis of the data.

The exchange of functions is to be effective on February 28, at which time the collection and compilation of the following series will be transferred to the Bureau of the Census: (1) Monthly reports on sales from approximately 30,000 independent retail stores; (2) monthly reports from approximately 3,300 wholesale firms, giving information on sales, accounts receivable, collections, and inventories (with a special form of inquiry in the drug trade); (3) monthly reports from approximately 2,000 manufacturing establishments, giving information on sales, accounts receivable, and collections (with a special form of inquiry in the drug trade); (4) monthly reports on confectionary poundage from approximately 150 manufacturers, showing pounds sold during each period; and (5) quarterly reports on canned food stocks. The reports on canned vegetable stocks are obtained directly from the National Canners Association which collects the figures from the entire industry; stocks of canned fruits are reported by some 60 packers; and both canned vegetable and fruit stocks are reported by approximately 500 wholesalers.

All chain store data will be collected by the Bureau of Foreign and Domestic Commerce as at present. The small number of organizations and the fact that these data are published in the form of percentage changes and indexes make the function of collection a minor factor.

Census Survey of Business. The Census Survey of Retail Stores and Wholesale Establishments covering the year 1937 and the first half of 1938 was completed in January. The schedules tabulated in this survey were limited to those received from identical establishments or organizations (1935, 1937, and the first half of 1938) which reported for the Census of Business, 1935, and which had not changed their methods of operation up to the close of the Survey period, June 30, 1938. The final results were issued in one volume on Retail Trade; one volume on Wholesale Trade; and 12 wholesale trade or kind-of-business studies.

In the Retail report data are presented for chain and independent stores separately, and cover such subjects as size of business; cash, credit, and installment sales; proprietor withdrawals; pay roll; and inventories. Figures are given for the country as a whole, for States, and for the 13 cities having a population of more than 500,000 in 1930.

The 12 Wholesale Trade reports present information by kinds of business on dollar sales for the years 1935, 1936, 1937, and the first half of 1938; pay roll for the years 1935 and 1937; and inventories at the end of the years 1935, 1936, and 1937. Sales for the year 1937 and the first half of 1938 are shown by quarters. Changes in size of establishments, 1935 to 1937, are also shown; wholesale establishments are classified according to their usual term of sale; and 1937 sales are analyzed to show cash and credit business separately. The Wholesale volume presents statistics for the United States as a whole, for 29 States, and for the 13 largest cities.

Statistics of State and City Governments. Press releases summarizing the types of proposals submitted to the voters by State and city governments in the 1938 elections were issued during December. These are the first reports issued by this Bureau on this aspect of State and municipal government. The analysis of State measures submitted to the voters includes classifications as to whether the proposals were constitutional amendments, whether they applied to local governments or only to the State, whether approved or defeated, subject matter, and number voted on at one time. The analysis of measures voted on in cities over 50,000 population provides a summary of the various types of measures that were accepted or defeated. The proposals are classified by subject, those for bond issues being further analyzed by purpose of the issue. The Bureau expects to issue reports of a similar nature analyzing the proposals of the governors to the State legislatures.

A *Digest of State Laws Relating to Inheritance and Estate Taxes* in 1938 was released in November. This digest presents in summarized form the chief items of information relating to inheritance and estate tax laws of each of the 47 States and the District of Columbia having such taxes, with citations to the State acts.

The collection of financial statistics of States was resumed for 1937, and preliminary releases are now available for nearly all States. Because of an economy order in 1933, the financial statistics of States have not been collected for fiscal years since 1932, and the financial statistics of cities having a population of less than 100,000 were also discontinued at the same time.

C. L. D.

Board of Governors of the Federal Reserve System

A revised form for use by banks in submitting reports of condition was adopted recently in nearly identical form by the Comptroller of the Currency, the Federal Deposit Insurance Corporation, and the Board of Governors of the Federal Reserve System and was approved by the Executive Committee of the National Association of Supervisors of State Banks. It was first used in the December 31, 1938, call for reports of condition. The revised re-

port form is described in the January, 1939, issue of the *Federal Reserve Bulletin*, pages 22–23.

Among the most important changes in the form are a revision in the classification of loans and the addition of information relative to the maturity groupings of securities held. The new classification of loans is based more on purpose of loans than on type of collateral. Information will be obtained on commercial and industrial loans, on agricultural loans, and on loans made for the purpose of purchasing and carrying securities, as well as on open-market paper, brokers' loans, and real estate loans.

Security holdings will be reported with practically the same detailed classifications as to issuers as before and, in addition, for the broad classifications figures will be given as to holdings of securities maturing in five years or less. For United States Government obligations additional maturity groupings will be shown.

Banks have been supplied with detailed instructions which will not only assist them in preparing the report but should improve the comparability of the reported figures.

The statement of weekly reporting member banks has been revised to correspond in general with the changes referred to above.

The Division of Research and Statistics has available for distribution upon request several statistical studies of turnover of demand deposits, interbank deposits, and time deposits at individual banks and at groups of banks during the period 1925–1936. These studies make use of data not heretofore generally available.

Monthly indexes of the production of durable and nondurable manufactures have recently been compiled with a view to facilitating interpretation of current developments in manufacturing output. Back figures for these indexes for the period from January 1919 to date were published in the *Federal Reserve Bulletin* for January 1939 and current figures will be shown regularly in the *Bulletin* and in the Board's business index statement. A description of the new indexes may be obtained upon request from the Division of Research and Statistics.

The Annual Report of the Board of Governors for 1938 became available at the end of January. The report contained a discussion of the problems of banking regulation and supervision and of credit and monetary control under conditions of large excess bank reserves. It also included the usual surveys of business and credit conditions and of Federal Reserve System operations in the year. The report for 1938 was issued in one edition and not in two editions as had been the custom with previous Annual Reports. The earlier and brief edition of the report had contained the text and the records of policy actions, and the complete edition which appeared later had included in addition a large number of statistical tables and some other appendix material. This year's report contains only a few of the statistical tables and omits some of the appendix material previously published. The additional material previously included in the complete edition of the Annual Report will be made available in the *Federal Reserve Bulletin* or in some other form.

A new edition of the Federal Reserve chart book was issued in February with all information available as of January 25, 1939, plotted on the charts. This book was first published in September, 1938, containing information as of August 31, and was briefly described in these notes in the September issue of the JOURNAL.

The Federal Deposit Insurance Corporation

During December, the Federal Deposit Insurance Corporation released figures concerning the result of its call upon insured banks for a report on their deposits as of September 21, 1938.

Banks reported the number of their accounts and amount of their deposits in the following types: demand deposits of individuals, partnerships, and corporations; time deposits of individuals, partnerships, and corporations; interbank deposits; public funds of States and their political subdivisions; United States Government and postal savings deposits; uninvested trust funds; outstanding drafts; other items. Each type of deposit was classified in the following size groups: $5,000 and less; $5,000 to $10,000; $10,000 to $25,000; more than $25,000.

In the analysis, insured commercial banks are grouped by State, by size as measured by amount of deposits, and by the per cent of deposits insured under the present provision of a maximum of insurance of $5,000 for each depositor. The study includes a comparison of the insurance protection which is given with a maximum of $5,000 with the insurance protection which would be given with a maximum of $10,000 and of $25,000.

The results of the study will be published in the Annual Report of the Federal Deposit Insurance Corporation for the year ending December 31, 1938.

Securities and Exchange Commission

In December, 1938, the Commission made public the first of a series of reports based on a Census of American Listed Corporations. The Census, a W. P. A. project sponsored by the Commission, is designed to abstract the more significant data available in registration statements filed under the Securities Exchange Act of 1934, and covers about 2,000 corporations. The report released in December contained selected information on 12 steel producers with assets over $100,000,000 each. It provided individual data for each of the companies and also combined data for all companies in the group. Included in the data on individual companies were a general survey, the names of the parents and subsidiaries of each company, the outstanding security issues of each company, 16 financial and operating ratios for each company, salary data for each company, and individual balance sheets, profit and loss statements, and surplus reconciliations. The combined data for the group as a whole included a balance sheet, a profit and loss statement, a surplus reconciliation, totals of selected expense items and 16 operating and financial ratios. Similar summaries will be issued during the early months of 1939 covering companies in other major industries.

A further installment of the Commission's study of investment trusts and

investment companies was released in January, 1939. It dealt with the performance of large closed-end and open-end management investment companies during the period from 1927 to 1937 and attempted to ascertain through statistical analysis the extent to which the funds under the administration of investment companies have been increased or decreased as the result of the activities of management, and to determine factors influencing performance.

The Public Utilities Division released data on security issues of electric and gas utilities for the years 1935–1938. The report covered 250 separate issues which were publicly offered or sold privately during the year indicated, the price to the public, price to underwriters, net proceeds to issuer and price range, where available, from date of issuance to December 31, 1938.

Federal Trade Commission

The Commission's investigation into the motor vehicle industry (Public Resolution No. 87, 75th Congress, 3rd Session) is nearing completion. The resolution of Congress directs the Commission to investigate the policies employed by manufacturers in distributing motor vehicles, accessories and parts and the policies of dealers in selling motor vehicles at retail, with the twofold purpose of determining (1) the extent of monopolistic control in manufacturing and distributing automobiles and accessories and the methods of obtaining such control and (2) the extent to which any of the antitrust laws are being violated.

To this end the methods of distribution of the principal automobile manufacturers have been intensively studied and their records examined and a large number of dealers have been interviewed. An important part of the inquiry is in connection with the operation of finance companies, both affiliated and independent, as related to the sales of manufacturers to dealers and of dealers to consumers.

The Commission is charged by the resolution with the duty of reporting to Congress, together with its finding of fact, such recommendations for remedial legislation as it regards necessary and proper.

United States Tariff Commission

In June 1938 the Tariff Commission published a report entitled "Current Trends in Imports." The report is tabular in form and the statistics are for 187 leading articles imported into the United States in 1936, 1937, and in the first quarter of 1938. The Commission's press release, issued in conjunction with the tables, analyzes the decline in imports which began in midyear of 1937 and continued into 1938, and makes various comparisons of the trends in imports, exports, and domestic production.

A report entitled "Dominion and Colonial Statistics" supplements certain statistical data published by the Commission in 1922, in a report on colonial tariff policies. Figures are given for colonial empires and for the different dominions and dependencies of the world, showing their area, popu-

lation, density of population, imports, exports, and foreign trade per capita. Trade with their respective mother countries and with the United States has been tabulated. Some of the tables show the development of trade by selected years starting with 1900 or 1903.

The latest edition of the Commission's pamphlet "Changes in Import Duties Since the Passage of the Tariff Act of 1930" is now in press and will be available for distribution at an early date. Besides showing all changes made in rates of duty since 1930, including those made under 19 trade agreements, the pamphlet contains up-to-date information on current import excise taxes which have the general effect of tariff rates.

A report entitled "United States Imports and Duties, 1937" was compiled by the Richmond unit and published by the Commission during the year. It arranges statistics of imports for consumption by schedules and paragraphs of the Tariff Act of 1930 instead of by the commodity-group classification used in Foreign Commerce and Navigation of the United States published by the Department of Commerce.

The Richmond office also compiled in 1938 an index to "Foreign Crops and Markets," a weekly publication issued by the Department of Agriculture. The value of this series of reports as research material was greatly impaired by the failure to maintain such index after 1930. The index compiled at Richmond therefore answers a need and has been widely distributed by the Department of Agriculture.

Reports summarizing the trade agreements between the United States and the United Kingdom, Canada, and Czechoslovakia have been issued by the the Tariff Commission. These reports contain detailed analyses of the agreements, discussion of trade between the United States and these countries, and economic data relating to commodities on which the United States granted concessions. Similar reports have been issued on most of the other important agreements previously concluded.

A detailed statement regarding the statistical and other work of the Tariff Commission is set forth in its annual report to Congress for 1938.

Farm Credit Administration

Further reorganization of research work in the Farm Credit Administration has resulted in the establishment of two separate research divisions, the "Economic and Credit Research Division" and the "Cooperative Research and Service Division." Until recently these units functioned as subdivisions in a research division. Research dealing with credit problems of farmers in acquiring and operating farms will be carried on by the staff of the Economic and Credit Research Division. Research on problems of farmers' cooperative marketing and purchasing associations will be conducted by the Cooperative Research and Service Division which also performs the service and educational work for cooperative associations. E. C. Johnson, Chief of the Economic and Credit Research Division, and T. G. Stitts, Chief of the Cooperative Research and Service Division, report to the Governor of the Farm Credit Administration through E. A. Stokdyk, Deputy Governor.

Bureau of Mines

The establishment of a Secondary Metals Section of the Bureau of Mines, United States Department of the Interior, at Pittsburgh, Pennsylvania, with James S. Earle of Plainfield, New Jersey, as Supervising Engineer, was announced by Secretary of the Interior Harold L. Ickes on January 17, 1939.

The creation of a section to deal exclusively with secondary metals, according to Dr. John W. Finch, Director of the Bureau of Mines, was necessitated by the constantly increasing importance of scrap as a factor in metal supply and by the growing demand upon the Bureau of Mines for authoritative information in this field. Bureau officials have long recognized that the stock of metals in use and the scrap returning to industry constitute a great national resource, and that the formulation of a sound public policy with respect to raw material supply is dependent upon a thorough understanding of the secondary metal problem. Not only is the scrap industry itself in need of more frequent and detailed data than have heretofore been available, but the rapid growth of secondary metal production is exercising a profound influence on mining which is too little understood by reason of insufficient data. In the light of these facts, a thorough knowledge of the extent and industrial incidence of secondary metal production is highly essential to the regular flow of current supplies as well as to the effective conservation of irreplaceable natural resources. Although annual statistics on the production of secondary metals of the nonferrous group have been compiled over a period of thirty years, it is only now that funds have become available for regular coverage of the vast resources of ferrous scrap that annually return to the industrial cycle. The various fact-finding activities of the Bureau in regard to scrap will be consolidated in the new section and expanded as need and opportunity arise.

Bureau of Labor Statistics, U. S. Department of Labor

There have recently been completed surveys of wages, hours, and working conditions for furniture, electrical apparatus and supplies, meat packing, fertilizers, woolens and worsteds, and the dyeing and finishing of textiles. Work is nearing completion on similar surveys of the iron and steel industry; knit goods, including full-fashioned and seamless hosiery, outerwear, underwear, and knit cloth; and foundries and machine shops, including agricultural implements, machine tools, textile machinery and parts, and other machinery. Field work has been begun on boots and shoes and the apparel industries; a special effort is being made to cover those branches of the clothing industry on which wage rates are known to be low.

Three new industries—glass, machine tools, and rubber boots and shoes—have been added to the list of those for which rates of labor turnover are regularly computed, bringing the total to twenty-seven.

For the use of the industry committees appointed by the Administrator of the Fair Labor Standards Act, the Bureau of Labor Statistics is making cost of living surveys in ten small cities. Five northern cities and five south-

ern cities are included, all with populations between 10,000 and 20,000. A typical northern budget and a typical southern budget are priced in each locality, and prices are also obtained for the budget used in the W. P. A. survey of inter-city differences of living costs made in 1935.

A bulletin on retail prices of electricity in 51 cities from 1923 through 1938 is in the course of preparation. Indexes as well as prices are presented for consumption of electricity representing three typical services. Indexes of rents by types of dwellings in each of thirty-two cities are now available.

From January 23 to February 1 the retail price field representatives met in Washington for their annual conference. The meetings were given over to discussions of problems met in the field and training on pricing procedures. Special attention was given to rentals, and specifications for shoes and drugs and toiletries.

There has been set up a technical subcommittee of the Bureau's price committee, to deal with questions of specifications, weights, classification, etc., and to insure coordination of the work among the three divisions of the Bureau concerned with price work—Retail Prices, Wholesale Prices, and Cost of Living. The Wholesale Price Division is continuing its general program of revision and improvement. Work on the new index of delivered prices of cement has been virtually completed and the new series will be issued early in the summer. Revision of the price series for hosiery, work clothing, and refrigerators is under way. Experimental calculations and tests of different types of index numbers are being made in connection with the wholesale prices of automobiles.

The Bureau is cooperating with five other Federal agencies in making studies for the use of the Temporary National Economic Committee. Special analyses have been made of wholesale and retail prices, employment, earnings, and related data.

Frequency and severity rates of industrial injuries for 1937 have been computed and will appear in a forthcoming issue of the *Monthly Labor Review*. The study is based on the experience of nearly 22,000 firms which were included also in the 1936 survey. The article also gives estimates of all industrial and occupational injuries for the year. The sample for construction has been considerably enlarged through the cooperation of officers of local chapters of contractors' associations. In connection with the surveys for 1937 and previous years, information on employers' injury records was obtained by Bureau field agents from the files of state workmen's compensation offices, while the number of man-hours worked during the year, used as a base in computing rates, was secured directly from the employers. Beginning with a survey for 1938, which is now under way, the data on injuries are also being obtained directly from the companies. The new procedure will eliminate much of the delay inherent in the old method. It should also result in more uniform reporting, since there is a wide variety in the reporting requirements of the individual state agencies. In addition to the all-industry study for 1937, a study was made of injuries in the fertilizer industry; rates are shown for four factory departments and for three geographical regions.

There have recently been completed studies of labor requirements in the production of sand and gravel, electrical machinery and supplies, and the construction of school buildings. Another survey deals with the proportion of the various costs in different types of road construction.

New estimates are available of the total number of new dwelling units provided in non-farm areas in 1937 and 1938.

Women's Bureau, U. S. Department of Labor

The State data available that indicate employment trends by sex have been assembled (Bulletin 159) with the purpose of showing how the unemployment situation in recent years has affected women in the chief woman-employing industries.

The Bureau has made a study (Bulletin 166) of the effects of minimum-wage laws, to determine whether they attain their objectives when put into operation at a time of business depression or of such fundamental changes as were going on in dry cleaning when Ohio made mandatory its order for that industry in 1935. Accordingly, pay-roll records before and after wage orders were studied in the power-laundry industry in New York and Pennsylvania, the latter having no minimum-wage law at the time, and in the dry-cleaning and dyeing industry in Ohio and Indiana, the latter with no legal control of women's wages.

Bureau of Research and Statistics, Social Security Board

The Division of Public Assistance Research is analyzing data on the social characteristics of the recipients accepted for public assistance during the fiscal year 1937–38, on the basis of annual reports submitted by State agencies administering public assistance. Two special articles, "Analysis of Grants to 586,000 Recipients of Old-Age Assistance" and the "Relief Status of One Million Recipients of Old-Age Assistance in 1936–37 and 1937–38," published in recent issues of the *Social Security Bulletin*, present a partial summary of the data. A third article which deals with the marital status and living arrangements of old-age recipients will be published in the *Bulletin* in the near future.

A study is being conducted and comparison made of mothers' aid laws and plans for aid to dependent children approved under the Social Security Act. An article, now in preparation, will present data on the number of recipients, the amounts of obligations incurred, and the coverage of the program for mothers' aid and aid to dependent children for the period 1932–1938.

Plans are being made for a national conference of directors of research and statistics of State public welfare departments to be held in Washington some time in May under the direction of the Division of Public Assistance Research. The first national conference of this kind, held in December 1936 at the time of the annual meetings of the American Public Welfare Association, did much to stimulate interest in research and statistics in the States and to provide an opportunity for an interchange of experience among persons engaged in similar work.

I. S. Falk, Assistant Director of the Bureau of Research and Statistics, in charge of health studies, has been serving as a member of the Technical Committee on Medical Care of the President's Interdepartmental Committee to Coordinate Health and Welfare Activities. This Committee is charged with responsibility for the preparation and assembling of statistical data and other material in connection with the development of a national health program outlined in the Interdepartmental Committee's report and recommendations on national health recently submitted to the President and transmitted by him with a special message to the Congress. During recent weeks, the Committee has held a series of conferences with representatives of various professional and social organizations and other interested groups, to obtain expressions of opinion and suggestions with regard to proposals now under consideration in this field.

Research and analysis dealing with quantitative factors affecting proposals for extension of coverage under the old-age insurance program, and for other substantive changes in the provisions of law relating to this program, have received new emphasis in the Bureau of Research and Statistics since the publication of the Final Report of the Advisory Council on Social Security and the Social Security Board's report on proposed changes in the Act. Estimates have been prepared of the numbers of persons in various types of employment likely to be affected by proposed changes. Completed estimates, stated in terms of the numbers likely to be engaged in such jobs at some time during 1939, cover maritime employment, agricultural labor, farm operation, unpaid family work, domestic service, self-employment, professional employment, public service, employment for non-profit institutions, casual employment, and work relief programs. Techniques and methods are being developed for projecting certain factors such as volume of social security tax receipts and benefit payments into the future. The relation of such projections to estimated trends in population, earnings, and national income is also being studied, and quantitative evaluations are being made wherever they are feasible.

Revised statistical forms and instructions for the reporting of benefit statistics by State unemployment compensation agencies were approved by the Social Security Board at the end of December. The major revisions of the benefit-statistics report forms related to the need for a greater degree of uniformity in the items reported by State agencies. A diversity of concepts underlying the statistical reports had developed as the result of revisions in administrative procedures in most State agencies. The statistical reports, as now revised, bring about a greater consistency between procedures in effect and the statistical items reported. Consequently, the reports will yield more accurate and adequate data for purposes of evaluating the administrative load in State agencies. Although the major emphasis of the revised benefit-statistics program had been to simplify reporting and increase administrative usefulness, the increasing demand from students of unemployment compensation problems, other governmental agencies, and the general public has also received recognition.

As a part of the study of simplification of unemployment compensation administration, estimates of the increased costs resulting from shortening the waiting period for unemployment benefits based on distributions of employment and unemployment by duration for the years 1931–1938, have been completed. Results of this study will be summarized in an article in the *Social Security Bulletin* for January. A detailed statement of the technique used together with the cost estimates will shortly be issued.

Bureau of Old-Age Insurance, Social Security Board

The tabulation of data, from the wage records of the Old-Age Insurance system in Baltimore, for approximately 30,500,000 persons employed in covered industry in 1937 is now nearly completed. The tabulation has been made by age, sex, color, intervals of individual earnings during the year, and state in which employed; and a distinction has been drawn between "nonmigrant" and "migrant" employees, upon which will be based a study of wage earner migration from the states in which account numbers were assigned to those in which employees were working in 1937.

This tabulation covers about 95 per cent of all employees who worked in the industries covered by the Old-Age Insurance system during the first year of operation. It will, however, give a very adequate picture of the personal characteristics and individual earnings of employees covered by the Social Security Act. In the corresponding tabulation for 1938, which it is hoped will be completed soon after the end of the present calendar year, information also will be available with reference to individual industries, the quarters of the year in which workers were employed, and the ratio of labor turnover.

Work is proceeding simultaneously on the first complete tabulation of data for employers in covered industry, for the first quarter of 1938. This will give figures for total employment and pay roll, with distributions by size of firm, industry and state, and other geographical areas. Difficulties arising from the form in which returns are made by employers having establishments in more than one industry or more than one locality will impose limitations on the industrial and the finer geographical distributions. It is believed, however, that the results will be of material interest.

When the employer tabulation for the first quarter of 1938 has been completed, corresponding tabulations for the remaining quarters of the year will be proceeded with immediately. Beginning with data for the first quarter of 1939, it is planned to make employer tabulations at regular quarterly intervals.

The punching of substantive claims data was begun in November. Plans have been completed for tabulations which will be deferred, however, until data for several months have been accumulated.

Punch cards have been used for recording administrative statistics from claims for lump-sum payments since November 1938. "Administrative" cards have been punched for a 30 per cent sample of the claims certified for payment in November and December 1938, and tabulations have been com-

pleted from these cards; the punching of cards for January 1939 is now in process. The data obtained are used administratively in measuring the rate of handling claims in the different operations of the Bureau of Old-Age Insurance, and in the location and analysis of the causes of delay.

A study was made of Death Claims which were filed during the calendar year of 1937 and a table prepared showing a distribution by occupation and cause of death. For comparison with the earlier study of death rates by occupation based on data of the U. S. Census Bureau collected in 1930, tables were prepared for ten states (Alabama, Connecticut, Illinois, Kansas, Massachusetts, Minnesota, New Jersey, New York, Ohio, and Wisconsin) showing the percentage distribution of deaths by cause for selected occupations with a corresponding distribution of death rates in the same states used in the 1930 study which was published by the National Tuberculosis Association.

Division of Social Research, Works Progress Administration

Survey of Unemployed Not Receiving Public Aid. This survey is intended to ascertain the extent and character of need among urban and rural families containing unemployed workers who are not receiving public assistance. It will determine the amount and sources of income of such families, the characteristics of the workers, and measure the duration of their unemployment. Supplementary information obtained in rural areas will give a general indication of types of expenditures and dietary problems. The study is being conducted in 6 cities and in 20 rural counties in 10 states.

Survey of Pecan Shelling Industry. A survey being completed in San Antonio, Texas, is planned to give information on the economic and social factors affecting pecan shellers. Many of these are migratory workers who rotate from harvests of beets, cotton, and pecans. The lack of usual employment during the period of readjustment under the Wage-Hour Law has intensified relief demands and therefore increased the need for more adequate information on this group of workers.

Conference of WPA State Coordinators of Research and Statistical Projects. A conference of representative State Coordinators of Research and Statistical Projects was held in Washington during the week of January 16. Problems of project development, review and operation were considered from the State point of view, and programs of long range planning for white collar projects of the record and research type were discussed. The Coordinators in attendance were: A. C. London (Arkansas); James B. Sharp (California—Northern); Edwin B. Scheuer (California—Southern); John F. Moore (Connecticut); Milton Blanton (Georgia); Ferris Laune (Illinois); H. H. McCarty (Iowa); Henry L. Sickels (Minnesota); Neil W. McKay (New York State); Charles B. Lawrence, Jr. (New York City); Reed O. Burford (Pennsylvania); D. Roy Parker (Texas); Rulon A. Walker (Utah); and James A. McAleer (Virginia).

The following speakers participated in the program: Dr. Stuart A. Rice, Chairman, Central Statistical Board; Howard B. Brunsman, Associate Di-

rector, Division of Economics and Statistics, FHA; Paul F. Krueger, Acting Chief, Survey and Analysis Section, Division of Research and Information, USHA; Robert H. Randall, Consultant, NRC, State and Regional Planning; Robert C. Binkley, Chairman, Joint Committee on Research Materials of the Social Science Research Council and the American Council of Learned Societies. Among those of the Washington WPA staff who also addressed the conference were Mrs. Florence Kerr, Assistant Administrator in charge of Women's and Professional Projects, and Corrington Gill, Assistant Administrator in charge of Research, Statistics and Finance.

Rural Youth and Employment Opportunities. A detailed analysis of rural youth and employment opportunities is in progress. This study will show the occupations which youth enter and the extent of their unemployment. It will also present separately, work opportunities for farm, rural-nonfarm, and urban youth. Implications of the situation, with regard to both Federal programs and private employment, are developed.

Cooperative Plan for Rural Research. A comprehensive report of the Cooperative Plan for Rural Research giving organization, scope, and results for the first four years of operation has been completed. This includes brief descriptions of Federal surveys and a subject bibliography of State bulletins resulting from local surveys. In addition, individual reports have been prepared for the 41 States which have, at some time, participated in the cooperative plan.

Unemployment Surveys. In order to avoid the difficulties involved in usual concepts heretofore used in measuring unemployment, a new procedure is being tried out in seven cities in Southern Illinois on the basis of complete coverage. The method resulting from these surveys, will be applied on a sampling basis in Birmingham, Alabama; Toledo, Ohio; and San Francisco, California. Albany, New York, is conducting an unemployment survey as a WPA local project.

Division of Statistics and Economic Research, Works Progress Administration

A nationwide survey of the WPA recreation program is to be conducted in February. This survey is designed to provide information concerning winter recreation activities of the WPA program and will provide a comparison with the results of a previous summer study published under the title "Leisure-Time Leadership." The new study will yield information concerning the characteristics of the participants in the program, the types of activities which it is possible to carry out during winter months, and the qualifications of recreation leaders on the projects.

A new monthly tabulation of employment on all Federal work and construction programs financed by emergency as well as by regular funds is being prepared in cooperation with the Bureau of Labor Statistics. The data are summarized by state, by regular and emergency appropriations, and by operating agency.

A study of seasonal variation in employment and unemployment in the

construction industry is nearing completion. Another survey of seasonal employment in agriculture has been completed.

An investigation in progress involves estimates and analysis of the gross annual increase in the labor supply of the United States, with particular reference to its effect on the characteristics of the unemployed and on the problem of unemployment among youth.

National Research Project. During recent months the National Research Project has been concentrating on the publication of completed studies. Up to January, 1939, there has been published 32 reports incorporating the results of the various investigations carried out by this project.

Office of Education

Program for the Collection of Library Statistics. As part of the obligations of the recently established Division of Library Service in the Office of Education, a continuing program for the collection of statistics of libraries has been defined. Statistics of Public-School Libraries 1934–35, the first tabulation since 1929, is now available from the Superintendent of Documents as *Office of Education Bulletin*, 1937, No. 2, Vol. II, Chapter V. Price 20 cents. Statistics of public libraries are now being collected through cooperation with the State agencies for public libraries. A new form has been developed in cooperation with the university and college library officials for collecting data about university and college libraries. This form will be used during the year 1939.

Progress Toward More Uniform Reporting. The Office of Education called conferences in Pittsburgh, Pennsylvania, in November, and in Des Moines, Iowa, in December, for the consideration of questions in regard to the classification of school accounts raised by the Research Committee on School Accounting Practice at the Annual Convention of the National Association of Public School Business Officials in Chicago in October. Proposed changes will be formulated and presented to representative members of the profession for criticism and then to the National Committee on Uniform School Records and Reports for action. Other topics taken up at the conferences were records for school transportation and manuals for personnel and financial accounting.

Graduate School of the Department of Agriculture

The Graduate School of the Department of Agriculture has recently sponsored two series of lectures on statistics. During the first week in January Mr. W. G. Cochran, of the Statistical Department of Rothamsted Experimental Station, gave two lectures, the first on "The Function of Randomization in Experimental Design," and the second on "The Use of Transformations in the Statistical Analysis of Data." On January 30 Professor J. Shohat, of the University of Pennsylvania, began a series of six lectures to be held on alternate Monday evenings. Interpolation, approximation, and mechanical graduature are the broad topics of these lectures.

The Graduate School is contemplating the publication of reproductions of two or three famous articles published in the Eighteenth Century. Facsimiles of two articles by The Rev. Thomas Bayes will probably be included, the first "A Note on the Use of Divergent Series" and the second, "An Essay in Solving a Problem in the Doctrine of Chances." Both of these articles were published in the *Philosophical Transactions* (of the Royal Society) in 1763, twenty years after the death of The Rev. Mr. Bayes.

National Bureau of Economic Research, Inc.

A National Bureau volume, *Capital Consumption and Adjustment*, by Solomon Fabricant (291 pp., $2.75) has been chosen for the "Fifty Books of 1938" exhibition. "The purpose of this exhibition is to show the fifty current books of the highest artistic and technical excellence, selected on the merits of physical attractiveness, suitability to purpose, and the success with which the designer has met the problems imposed by editorial content and conditions of production." After the opening at the New York Public Library on February 15 under the auspices of the American Institute of Graphic Arts one set of the books was sent to the Golden Gate San Francisco Exposition, a second set to England, and a third is being exhibited in various cities throughout the United States.

A grant from the Carnegie Foundation enabled the National Bureau to appoint four research associates in 1938. Joel Dean of Indiana University acts as executive secretary of the Conference on Price Research and is working on studies of costs and pricing policies for both it and the National Bureau. Moses Abramovitz of Harvard University is preparing material for the business cycle monograph on commodity stocks. Raymond T. Bowman of the University of Pennsylvania has assisted in the completion of the studies in the field of real estate financing. His term was cut short by his appointment as Deputy Secretary of the Department of Public Assistance in Pennsylvania beginning February 1. E. Gordon Keith of Harvard University is surveying available data on fiscal policy and making a bibliography in preparation for projects to be initiated by the Committee on Research in Fiscal Policy under the chairmanship of W. L. Crum.

The 1938 series of National Bureau *Bulletins* was completed with the publication of a double issue, "Incomes from Independent Professional Practice, 1929–1936," by Simon Kuznets and Milton Friedman. Based on data collected by the United States Department of Commerce the *Bulletin* considers the average levels of net income in five professions—physicians and surgeons, dentists, certified public accountants, lawyers, and consulting engineers. Titles for the 1939 series of five *Bulletins* will be chosen from the following and other subjects: Changes in Output of Finished Commodities since 1879; the Volume of Consumer Credit; Analyses of Costs in Individual Enterprises; Cyclical Fluctuations in the Prices and Production of Specific Commodities; Manufacturing Production and Productivity; Differentials in Housing Costs; and Capital Formation in Post-War Business Cycles.

Volume Two of *Studies in Income and Wealth*—papers prepared for the

1937 meetings of the American Statistical and Economic Associations and the 1938 meeting of the Conference on Research in National Income and Wealth with the discussion—has been distributed to Contributing Subscribers. The first paper, "On the Measurement of National Wealth," is by the Chairman of the Conference, Simon Kuznets. The others are: "The Correction of Wealth and Income Estimates for Price Changes," by M. A. Copeland and E. M. Martin; "National Income, Savings, and Investment," by Gottfried Haberler; "Capital Gains in Income Theory and Taxation Policy" by Roy Blough and W. W. Hewett; "Problems in Estimating National Income Arising from Production by Government," by G. C. Means (Lauchlin Currie and R. R. Nathan, concurring); "Allocation of Benefits from Government Expenditures," by R. W. Nelson and Donald Jackson.

National Industrial Conference Board

Among the principal publications now planned and in the process of publication is a book on national income in the United States from 1799 to 1938. This book prepared by Dr. Martin, Director of the Economic Research Division of the Conference Board, is particularly valuable because it is the first one which includes income figures back to the census year of 1799. Previous income studies have gone back only as far as 1840, but in this study an effort was made to obtain a broad picture of the growth of income and its variations in the United States from the first recordings available. Income by kind and industrial origin, and income obtained from government are among the phases of the subject evaluated.

A book on concentration in voting control of corporations represents a study of data made available by the Securities and Exchange Commission, the statistical data for which are being prepared by H. D. Osborne. It is expected to indicate the importance of large holdings of voting stock, or ownership control over incorporated enterprises. Projected tabulations will show (1) the number and size of listed corporations, classified by the proportion of their voting stock held in blocks amounting to 10 per cent or more of the total outstanding; and (2) the number of holders of such blocks of stocks, classified by the amount of corporate assets represented by their holdings. Some study is also being devoted to dividends in the concentration of income.

Dr. Fausto R. Pitigliani, formerly of the University of Rome, is writing a book on the economic working of the Fascist State, basing his study on developments in Italy since 1927. A book on economic developments in Soviet Russia is also nearing completion.

Other important projects include: the work on various aspects of the price situation, as analyzed by Dr. Jules Backman; a report on family expenditures over a period of years by Dr. M. Ada Beney; a study of Latin American trade by Clyde L. Rogers, Assistant Director of the Economic Research Division; a study of depression and recovery in France and the United States by Harrison F. Houghton; and a series of pamphlets on typical developments affecting labor and management being compiled under the

direction of Harold F. Browne, Director of the Management Research Division of the Conference Board.

In addition, work on unemployment and employment continues, principally with the guidance of Major R. R. Lutz, Director of the Statistical Division, Dr. Roland P. Falkner, and Leonard H. Kuvin, Director of the Conference Division. Dr. Falkner is also revising the estimates of the national wealth.

Research Projects at Dun & Bradstreet, Inc.

Twin Surveys—Business Trend, Tax Burden. A large scale experiment with an unusual type of duplex questionnaire schedule was started about January 1st, when over 2,000,000 forms were mailed out to concerns all over the country. The left-hand half of this form, labeled "Business Trend Survey" asks for 1937 and 1938 sales volume along with inventories at the end of each year. The right-hand half entitled "Tax Burden Survey" provides space for noting ten different kinds of tax payments, under the following four main headings:

1. Federal taxes on business income—with a distinction between corporation returns and partnerships or proprietorships
2. Social Security taxes and contributions—with state and Federal amounts combined but a distinction between employee and employer contributions
3. Sales and Excise taxes on outgoing goods—separating Federal from state and local
4. All other state and local taxes—with separate space for income, property, franchise and miscellaneous taxes.

Concerns participating in this survey have the choice of sending both forms in together or of detaching the Tax Burden section for more careful study and later return. Usable returns during the first two weeks in January reveal that 76 per cent of the contributors chose to fill out both schedules, while the remaining 24 per cent have supplied sales and inventory figures but are withholding the tax schedule until a later date. Only a negligible few appear to have tax figures ready but no sales and inventory records. The number of usable returns up to date of writing has exceeded last year's returns during the same period.

Tentative publication plans call for preliminary estimates of sales and inventory trends for manufacturing, for wholesaling (in total) and for a few of the large retail trades to appear in the March issue of *Dun's Review;* the preliminary tabulation of the Tax Survey and additional Business Trend data in the April issue; final report on Business Trends in the May issue; and a detailed report on the tax findings in the June issue. Ability to maintain this schedule will be determined largely by the rate at which returns come in.

Wage and Hour Survey Data. Widespread recent interest among industrial trade associations in the problem of gathering information on wage rates and labor conditions seemed to deserve especial effort to assemble con-

venient information. Material on methods of making wage surveys, sample forms from various trade associations and discussion of the various methods, difficulties and pitfalls have been assembled and distributed widely on request.

Financial Ratios for Management Guidance. Under the title "They Said it With Inventories" by Roy A. Foulke, Manager of the Analytical Report Department, a 31-page pamphlet has been published giving fourteen important financial ratios for 72 lines of business based upon 1937 year-end figures. This is nine more lines of industry and commerce than were studied in "Signs of the Times" published in the preceding year. As a basis for the figures, 12,302 commercial and industrial business enterprises were studied.

In addition to the familiar "current ratio" the ratios portray in detail safe and healthy relations between the component items of a balance sheet· relation of net profit to sales, working capital and net worth; relation of sales to working capital, net worth and inventory; relation of debt to net worth, inventory and net working capital; and the relation of fixed assets to net worth.

For the first time these ratios are broken down into a three-way guide; one series representing the Upper Quartile, one series the Median, and one the Lower Quartile. With this three-way setup it is believed that the ratios will be of more value than ever before to business executives, bankers, mercantile credit men, accountants, and students of business affairs.

CHAPTER ACTIVITIES

The Albany Chapter

The Albany Chapter held a dinner meeting on November 15, 1938. C. M. Armstrong, Vice-President of the Chapter, presided. Thirty-six members and guests were present.

Dr. Gillett distributed copies of the preliminary report of the Chapter's Committee on Professional Standards for Statistical Workers in the service of New York State. He reported that this report would be published in the December issue of the *American Statistical Association Bulletin*. He also announced that several copies had been sent to people in the various parts of the United States who requested them.

The speaker of the evening was Wayne D. Heydecker, Director of State Planning. After indicating the broad scope of activities which may be investigated by the Division of State Planning, Mr. Heydecker gave a brief historical outline of population trends in this State, emphasizing the importance of topography as a deciding factor. He indicated, also, that state planning is not a new idea, mentioning the Erie Canal system of Governor Clinton's day as an important piece of state planning. In discussing the work of the Division, Mr. Heydecker pointed out that many projects have met with partial or complete failure because of the absence or inadequacies of records. Further difficulty is caused by the fact that records, when available, are seldom comparable with one another.

The Chapter from its beginning has been interested in the coordination and improvement of state statistics, and through a committee began the study of this subject several years ago. Largely as a result of Mr. Heydecker's talk and of discussion from the floor, the following resolution was adopted:

"Resolved, that the President of the Chapter appoint a committee to study the subject of coordination of statistics prepared by state agencies and to work with state officials on that subject."

At a dinner meeting of the Chapter on December 13, with 29 present, C. M. Armstrong, of the Division of Placement and Unemployment Insurance, New York State Department of Labor, gave a brief talk on the subject "Accounting as a Form of Statistics," which was followed by general discussion.

The discussion showed that accounting is one branch of statistics; that the dividing line between accounting and the usual idea of statistics is very vague; and that accounting and accounting reports should be judged to a considerable extent by the usual statistical measures of significance, homogeneity, etc.

The concepts of private accounting and public accounting were compared. The conclusion drawn from the discussion was that accounting records in both fields should yield as many important statistical facts as possible; that it is the proper function of the statistician to see that significant groupings of the money records of accounting be maintained and compared with the

corresponding statistical series showing the services performed or production achieved by the unit under observation.

The Boston Chapter

"The Relation Between Relief Expenditures and Employment" was the general topic for the meeting of the Chapter on November 29, 1938. Ralph G. Hurlin, of the Russell Sage Foundation, and Richard K. Conant, of the School of Religious and Social Work, Boston University, were the speakers. John Pearson, Regional Director, Social Security Board, and John J. Donnelly, of the Massachusetts Department of Public Welfare, led the discussion.

The Chicago Chapter

"The Business Outlook for 1939" was the topic of the third meeting of the Chicago Chapter, on December 8, 1938. Charles F. Roos, of the Institute of Applied Econometrics of New York City, was the speaker. In the course of his discussion of the subject, Dr. Roos showed a number of charts of different series of data essential to an analysis of business conditions and described some of the methods employed in compiling these series. Further discussion of the subject was given by John W. Miller, of Montgomery Ward & Company, Richard L. Johnson, of the Northern Trust Company, and Harland H. Allen, of Harland Allen Associates.

At the next meeting, on January 10, Richardson Wood, of the Editorial Board of *Fortune Magazine* of New York City, gave a very interesting talk on "Surveys of Public Opinion." In particular, Mr. Wood described in detail the manner in which *Fortune Magazine* conducts its surveys, the sampling methods that have been developed, the selection of interviewers, building the questionnaire, etc. At the conclusion of his talk, Robert N. McMurry, of the Psychological Corporation, spoke briefly on market surveys from the psychologist's viewpoint. Donald R. G. Cowan, of Swift and Company, gave the brief analysis of the various types of market surveys, those concerning operations within an organization as well as those relating to public opinion. Attendance at this meeting was 104.

The Cincinnati Chapter

Ed Rundquist, of the Psychological Laboratory of the Board of Education, spoke December 8 on statistical differences in the discriminative ability of positive and negative statements in adjustment questionnaires.

On January 12, Warren S. Thompson, Director of the Scripps Foundation for Research in Population Problems, Miami University, spoke on the replacement indexes for cities, and made a preliminary report of an analysis of various factors which are associated with the rate of reproduction, based upon an analysis of Chicago data.

The Cleveland Chapter

The second meeting for the season of the Business Statistics Section of the Cleveland Chapter was held at the Hollenden Hotel on October 31, 1938.

Eighteen members and guests were present. J. Iglauer, of The Halle Brothers Company, addressed the group. His subject was "Some Problems Arising from the Social Security Act."

The discussion of the Social Security Act was continued at the November meeting. C. A. Bartlett, Associate of William Odom Associates, addressed the meeting. The subject of Mr. Bartlett's address was "The Unemployment Compensation Law and the Possibility of Setting Our Own Tax Rate."

On Saturday, November 12, the 1938 Ohio Conference of Statisticians on Business Research was held in Columbus. The Conference was sponsored by the Bureau of Business Research of The Ohio State University. The Cleveland Chapter was well represented at the meeting.

The Connecticut Chapter

A regular and business meeting of the Chapter was held on January 16. Albert K. Kurtz, of the Life Insurance Sales Research Bureau at Hartford, spoke on the subject, "The Statistical Dictionary."

The following officers were elected: President, H. Daniel Darling; Vice-President, A. K. Kurtz; Secretary-Treasurer, L. M. Nichols; with Royal Meeker and Burton H. Camp serving as the Executive Committee.

The Detroit District Chapter

The Detroit District Chapter held a meeting on November 3, 1938, at which Stephen M. DuBrul, of General Motors Corporation, presided. C. Roscoe Simmons, of the Fordson Board of Education, spoke briefly on "The Significance of Population Estimates Based on School Census Data." John R. Stewart, Statistician of the Detroit Board of Commerce, explained his short-cut method of estimating Detroit population.

The New York District Chapter

Under the general topic, "Financing of Industries," five speakers addressed the December 13th meeting, the chairman for which was Robert Warren of the Institute for Advanced Study.

John E. Rovensky, of The National City Bank, discussed recent trends in commercial bank lending. Among the causes for the present total of commercial loans being less than half that of 1929, he cited smaller inventories resulting from corporate efficiency and improved transportation, corporate working capital surpluses remaining from public financing, chain store efficiencies and installment sales financed via public issues of securities. The trend towards the term loan and toward various forms of consumer credit was described, and the effects on the liquidity of bank assets discussed. The conclusion was that the reduction in liquidity is in reality less than it seems at first glance.

Lionel D. Edie, investment counsellor, commented on some non-political factors in putting private capital to work. He deprecated the tendencies to explain capital's unemployment solely by current governmental and tax policies and the fitting of causes within the traditional business cycle. Dr.

Edie denied capital's continuous willingness to work even when conditions appeared favorable. Waves of capital expansion through 1897–1907 and 1921–29 and waves of liquidity preference like 1909–21 and 1929 to date, seem to persist despite conventional cycle, fear of inflation, or political factors. Capital activity resulting from an aggressive spirit of enterprise seems to be a variable with alternate phases lasting 10 to 15 years. Historical precedent suggests an expansion phase within the coming two or three years.

Albert J. Hettinger, of the General American Investors Corporation, talked on the financing of industry by commercial banks. After citing the SEC studies of the high costs of security flotations for small enterprises, he gave a full account of the business loan experiences of both the RFC and the Federal Reserve Banks. In summary, RFC loans granted totalled 145 millions, repayments 35 millions, so that total outstanding is only 3 per cent of the 101 Federal Reserve reporting member banks. The Federal Reserve district banks have loaned 57 millions, currently outstanding about 18 millions. Their experience shows the ineligibility of more than half of all applicants who either seek proprietary capital or are too marginal to prove desirable debtors. He concluded that the commercial banks can and will serve most deserving industrial borrowers.

George H. Houston discussed conditions necessary to revive the demand for capital by private enterprise. Technological progress has increased the capital requirements per worker in manufacture. The continuous drain upon invested capital arising from obsolescence of equipment and of products was cited. Attention was called to the fact that recovery must be effected through the processes of rebuilding and developing the capital facilities of the country, thus doing away with the vast obsolescence that exists at the present time. This recovery cannot be effected without the revival of the spirit of enterprise on the part of business and investors. It was further emphasized that such a revival of the spirit of enterprise is not likely until a change has been effected in public policies relating to business. Confidence must be restored in the stability of our institutions and in the possibility of making a profit under conditions that will permit the retention of a reasonable portion. These conditions cannot be obtained by coercion along the lines of national economic planning but must be induced by encouragement from public opinion and from government policies favorable to business.

George O. May, of Price, Waterhouse & Co., spoke briefly on the changing character of investment demand. He told of observations of these changes in England both as to decreasing demand for equity capital and increasing demand for fixed charge investment resulting from a change from personal to institutional saving. In tax theory he described one view favoring more liberal treatment of income derived from risk-taking capital to encourage investment of that kind. To treat all income as representing equal ability to pay was, he thought, unsound in theory, and as progressive taxes rose higher the point might require reconsideration, though the problem of reducing different abilities to a common measure would no doubt be a difficult one.—*Irving Kahn*

The Philadelphia Chapter

The second meeting of the Philadelphia Chapter for the current year was held on December 9. The topic of discussion was "Taking a Picture of the Nation (Population, Resources, and Economic Activities)—Census of 1940." The Chapter was fortunate in having two speakers from Washington: Vergil Reed, Assistant Director of the Census, who spoke on the census program for 1940, and Harold D. Kube, from the Census of Manufacturers, who discussed plans for the 1939 Census of Manufacturers. There were thirty-three at the meeting, and it was obvious from the general discussion afterward that the speakers had greatly stimulated the interest of the members in the plans and some of the technical procedures involved in the Census of 1940.

The Pittsburgh Chapter

At the December 22nd meeting of the Pittsburgh Chapter, David Kurtzman, of the Pennsylvania Economy League, discussed the program and activities of the Western Branch of the Pennsylvania Economy League as it applies to efficient government in Allegheny County.

The San Francisco Chapter

The Chapter held its annual meeting on December 1 and elected the following officers for the ensuing fiscal year: President, D. R. Fuller, North American Investment Corporation; Vice-President, V. P. Timoshenko, Food Research Institute; and Secretary-Treasurer, Wm. A. Sturm, Research Department of the California State Chamber of Commerce. Mr. Fuller appointed M. R. Benedict, Giannini Foundation, University of California, and M. K. Bennett, Food Research Institute, members of the Executive Committee. The Secretary-Treasurer's report for the fiscal year ending October 1, 1938, showed: 109 members at the end of the year; five meetings of the Chapter held during the year with an average attendance of 40; and a balance of $241.55 in the treasury.

The subject for the regular meeting was "The Interrelations of Industry and Agriculture in Economic Cycles." Siegried von Ciriacy-Wantrup, of the Giannini Foundation, University of California, spoke on "Interrelations of Industry and Agriculture in the Long Cycle," and Vladimir Timoshenko, of the Food Research Institute, presented a talk on "Interrelations of Industry and Agriculture in the Short Cycle."

The Washington Statistical Society

A meeting of the Society on "Methods of Measuring Unemployment" was held on December 12, 1938, with Halbert L. Dunn, of the Census Bureau, acting as chairman. The speakers were: Calvert L. Dedrick, of the Census Bureau; George L. Webber, of the U. S. Employment Service; and John N. Webb, of the Works Progress Administration.

T. J. Woofter, Jr., of the Works Progress Administration, presided at the meeting on January 31 on "Population Mobility as It Affects Social and

Economic Statistics." Fifteen-minute talks were given by: Forrest E. Linder, of the Census Bureau; Merrill G. Murray, of the Social Security Board; Louis Levine, of the Social Security Board; and P. K. Whelpton, of the Central Statistical Board.

NEW MEMBERS

Auerbach, Samuel J., Statistical Draftsman, Arnold Bernhard Investment Counsel, New York City

Bader, Jerome J., Statistician, Writing Paper Manufacturing Association, New York City

Banks, J. E., Market Analyst, Fenner and Beane, New York City

Bernstein, Professor Dr. Felix, Professor of Biometrics, New York University, New York City

Bowden, Dr. Aneta E., Associate Statistician, U. S. Public Health Service, Washington, D. C.

Bowman, Dr. John R., Chief, Research and Statistics, Bureau of Highway Safety, Revenue Department, Commonwealth of Pennsylvania, Harrisburg, Pennsylvania

Boyd, Dr. Edith, Assistant Professor in Anatomy, University of Minnesota, Minneapolis, Minnesota

Bratcher, Dr. E. E., Associate Professor of Education and Director of Teacher Training and Placement, Mississippi College, Clinton, Mississippi

Buggy, Walter M., Bookkeeper, Jas. H. Billington Company, Philadelphia, Pennsylvania

Butler, Ralph, Manager, Over-due Accounts Department, British Ropes, Limited, Carr Hill, Balby, Doncaster, Yorks, England

Carter, Sam R., Director, Research and Statistics, State of Louisiana Department of Public Welfare, State Office Building, Baton Rouge, Louisiana

Cassidy, Andrew F., Assistant Statistician, Association of Gas Appliance and Equipment Manufacturers, New York City

Cavin, Dr. James P., Agricultural Economist, Department of Agriculture, South Building, Washington, D. C.

Chamberlain, Joseph W., Research Assistant, Boston Council of Social Agencies, Boston, Massachusetts

Childs, Frank E., Instructor, School of Business, University of Minnesota, Minneapolis, Minnesota

Courage, W. L., Manager, Statistical Department, Hudson Motor Car Company, Detroit, Michigan

Cresin, Roman, Chief of the Agricultural Statistics Section, Romanian Central Statistical Institute, Bucarest, Romania

Crouse, Charles W., Actuary, American Casualty Company, Reading, Pennsylvania

Day, Samuel H., Acting Chief, Division of Foreign Trade Statistics, Department of Commerce, Washington, D. C.

DeVinney, Leland C., Instructor in Sociology, University of Chicago, Chicago, Illinois

Eckerson, Helen F., State Statistician, Pennsylvania Works Progress Administration, Harrisburg, Pennsylvania

Farnsworth, Dr. Helen C., Associate Economist, Food Research Institute, Stanford University, California

Fawcett, Fernley G., Statistician, Dun and Bradstreet, Incorporated, New York City

Fels, Bruno M., Statistician, Public Administration Clearing House, Washington, D. C.

Ferebee, Dr. E. E., Chief Statistician, Illinois Emergency Relief Commission, Chicago, Illinois

Feuer, Celia, Social Science Analyst, Social Security Board, Washington, D. C.

Fischer, Professor Carl H., Assistant Professor of Mathematics, Wayne University, Detroit, Michigan

Fisher, Juliet, Instructor, Department of Economics and Sociology, Mount Holyoke College, South Hadley, Massachusetts

Fouch, Bernadine A., Associate in Statistical Research, Children's Bureau, U. S. Department of Labor, Washington, D. C.

Frick, Johannes S., Professional Assistant (Economist), Division of Economics and Markets, Department of Agriculture, Union Buildings, Pretoria, South Africa

Graham, Richard M., Chief, Division of Cotton and Oils, Bureau of the Census, Washington, D. C.

Hagood, Mrs. Margaret J., Research Associate and Statistical Technician, Institute for Research in Social Science, University of North Carolina, Chapel Hill, North Carolina

Hamilton, Professor Roger S., Associate Professor of Economics, Northeastern University, Boston, Massachusetts

Hedges, Elihu, Sales Research, Eastman Kodak Company, Rochester, New York

Henderson, Donald E. V., Monograph Editor for Science Research Associates, Chicago, Illinois

Herrick, Charles, Research Technician, National Resources Committee, National Capital Park and Planning Commission, Washington, D. C.

Hinshaw, R. F., Statistician, Kansas City Branch Office, Federal Crop Insurance Corporation, Kansas City, Missouri

Juliber, Gustave S., Student, New York University, New York City

Katz, Leo, Assistant Superintendent, Statistical Project No. 7004, Works Progress Administration, College of Education, Wayne University, Detroit, Michigan

Kofke, Charles L., Director of Research and Statistics, Unemployment Compensation Commission of New Jersey, Trenton Trust Building, Trenton, New Jersey

Kullback, Dr. Solomon, Lecturer in Statistics, The George Washington University, Washington, D. C.

Lewis, David N., Assistant Controller, Rochester and Pittsburgh Coal Company, Indiana, Pennsylvania

Linck, Lawrence J., Special Consultant, Division of Venereal Diseases, United States Public Health Service, Chicago, Illinois

Locke, Dr. Henry D., Supervisor of Research, Liberty Mutual Insurance Company, Boston, Massachusetts

Longstreet, Victor M., Senior Economist, Board of Governors of the Federal Reserve System, Washington, D. C.

Lunenburg, Lillian, Assistant Economist, Division of Construction and Public Employment, U. S. Bureau of Labor Statistics, Washington, D. C.

Meyrowitz, Alvin, Statistician, Market Analysts, Incorporated, New York City

Mullen, Mrs. Frances A., Teacher, Fenger High School, Chicago, Illinois

Narodny, Leo H., Statistician, De Coppet and Doremus, New York City
Nicoll, A. Olivia, Statistician, National Republican Congressional Committee, Washington, D. C.
Nisselson, Harold, Student, New York University, New York City
Ober, Gale R., Jr., Statistical Assistant, Real Property Inventory of Metropolitan Cleveland, Cleveland, Ohio
Preinreich, Dr. Gabriel A. D., Accountant, New York City
Press, Harold, Senior Statistician, Illinois Emergency Relief Commission, Chicago, Illinois
Regalado, Rosendo, Chief, Division of Labor Statistics, Department of Labor, Manila, Philippines
Rider, Rowland V., Junior Statistician, Bureau of Pneumonia Control, New York State Department of Health, Albany, New York
Rubin, Edward P., President, Security Supervisors, Incorporated, Chicago, Illinois
Schunior, George E., Statistician, Sales Department, Reed Roller Bit Company, Houston, Texas
Simonovitz, Samuel, Deputy Administrator, Milk Administration, State Office Building, Hartford, Connecticut
Slomin, Herman, Junior Statistician, Social Security Board, American Meter Building, Saratoga and Holliday Streets, Baltimore, Maryland
Smyth, William, Assistant Analyst, Financial Department, Mutual Life Insurance Company of New York, New York City
Snider, Dr. Joseph L., Associate Professor of Business Statistics, Harvard Business School, Soldiers Field, Boston, Massachusetts
Thaden, Dr. J. F., Assistant Professor of Sociology and Research Assistant, Michigan State College, East Lansing, Michigan
Tietze, Dr. Christopher, Director of Mental Hygiene Study, School of Hygiene and Public Health, The Johns Hopkins University, Baltimore, Maryland
Topkis, Bernard, Associate Economist, U. S. Bureau of Labor Statistics, Washington, D. C.
Tregaskis, Madeline, Assistant Secretary and Statistician, Narrow Fabrics Institute, Incorporated, New London, Connecticut
Ulrey, Ivon W., Statistician, Columbia Engineering Corporation, New York City
Van Vechten, Dr. C. C., Instructor in Sociology, Wayne University, Detroit, Michigan
Wade, Professor Thomas L., Jr., Professor of Mathematics and Accounting, Mercer University, Macon, Georgia
Wasserman, Dr. Max J., Chief Statistician, Bureau of Old Age Insurance, Social Security Board, Washington, D. C.
Weissman, Irving, Director, Department of Social Research, Social Planning Council of St. Louis, St. Louis, Missouri
Wood, Loring, Associate Statistician, U. S. Bureau of Labor Statistics, Washington, D. C.
Younger, Leo, Jr., Salesman and Sales Analyst, J. H. Semel and Company, New York City

PROCEEDINGS

One-hundredth Annual Meeting

BOOK-CADILLAC HOTEL, DETROIT

PROGRAM

Tuesday, December 27, 1938

—10:00 A.M.—

THE DYNAMICS OF AUTOMOBILE DEMAND
(With the Econometric Society)
Chairman: Leonard P. Ayres, The Cleveland Trust Company
Statement of the Problem
Seward L. Horner, General Motors Corporation
Factors Governing Yearly Changes in Domestic Automobile Demand
Charles F. Roos, The Institute of Applied Econometrics
Additional Factors Governing Monthly Changes in Domestic Automobile Demand
Victor von Szeliski, The Institute of Applied Econometrics

COLLECTION AND COMPILATION OF STATE CRIMINAL STATISTICS
(Arranged by Committee on Statistics of Delinquents and Criminals)
Chairman: Thorsten Sellin, University of Pennsylvania
Central State Bureaus (for the collection of criminal statistics)
C. C. Van Vechten, Wayne University
State Planning for Uniform Criminal Statistics
Philip M. Hauser, Bureau of the Census

—2:30 P.M.—

THE DYNAMICS OF AUTOMOBILE DEMAND
(With the Econometric Society)
Chairman: Theodore H. Brown, Harvard Graduate School of Business Administration
New Measures of Automobile Prices and Values
Andrew T. Court, Automobile Manufacturers Association
Significance of the Findings
Stephen M. DuBrul, General Motors Corporation
Discussion: Sidney W. Wilcox, Bureau of Labor Statistics
Harold Hotelling, Columbia University
Louis H. Bean, Agricultural Adjustment Administration
John W. Scoville, Chrysler Corporation

STANDARD CLASSIFICATIONS USED IN CRIMINAL STATISTICS
(Arranged by Committee on Statistics of Delinquents and Criminals)
Chairman: Ronald H. Beattie, Bureau of the Census
Standard Offense Classification
Rolf T. Harbo, Department of Justice
Classifications of Methods of Release
Bennet Mead, Bureau of Prisons

Tuesday, December 27, 1938

—2:30 P.M.—

CURRENT TRADE STATISTICS AND WHAT THEY MEAN

Chairman: Willard L. Thorp, Dun & Bradstreet, Inc.

Current Trade Statistics and What They Mean
A. C. Steedman, Dominion Bureau of Statistics

Sampling Problems in Current Trade Statistics
Edward L. Lloyd, Bureau of Foreign and Domestic Commerce

The Collection and Interpretation of Inventory Data
Walter Mitchell, Jr., Dun & Bradstreet, Inc.

Notes on the Interpretation of External Statistics
Q. Forrest Walker, R. H. Macy & Company

Use Approach to Current Trade Statistics
Theodore N. Beckman, Ohio State University

BIO-STATISTICAL PROBLEMS INVOLVED IN THE ATTAINMENT OF SATISFACTORY STANDARDIZATION OF AN INSECTICIDE

(Arranged by the Biometrics Section)

Chairman: C. I. Bliss, Sandusky, Ohio

The Origin and Development of the Peet-Grady Method
F. L. Campbell, Ohio State University

Biostatistical Problems Involved in the Standardization of Liquid Insecticides
George W. Snedecor, Iowa State College

The Elimination of the Effect of the Sexes by Equalization of Their Numbers
W. A. Simanton and A. C. Miller, Gulf Research and Development Corporation

—8:00 P.M.—

PROBLEMS IN INDUSTRIAL REPLACEMENT AND STANDARDS OF QUALITY

(With the Econometric Society)

Chairman: Robert W. Burgess, Western Electric Company

Some Important Characteristics of a Standard of Quality
Walter A. Shewhart, Bell Telephone Laboratories

The Problem of the Replacement of Durable Industrial Equipment—Some Dynamic Aspects
J. S. Bain, Harvard University

Contribution to the Analysis of Industrial Replacement
Alfred J. Lotka, Metropolitan Life Insurance Company

Discussion: Gabriel A. D. Preinreich, Certified Public Accountant, New York

SAVINGS AND THE SECURITY MARKETS

Chairman: Spurgeon Bell, The Brookings Institution

The Geographic Distribution of Underwriting, 1925–32
James D. Magee, New York University

The Volume of Savings in the United States, 1933–37
Raymond W. Goldschmidt, Securities and Exchange Commission

Trends in the Canadian Bond, Stock, and Commodity Markets, 1928–38
Alice Willard Turner, Wood, Gundy & Company, Ltd.

Discussion: Edward C. Simmons, University of Michigan

Tuesday, December 27, 1938

—8:00 P.M.—

ROUND TABLE ON STATISTICAL DEFINITIONS OF "GAINFUL WORKER," "UNEMPLOYMENT," AND RELATED CONCEPTS

Chairman: Paul H. Douglas, University of Chicago
Discussion: John N. Webb, Works Progress Administration
Aryness Joy and Loring Wood, Bureau of Labor Statistics
Leon E. Truesdell, Bureau of the Census
Calvert L. Dedrick, Bureau of the Census
Leonard Kuvin, National Industrial Conference Board
A. H. Leneveu, Dominion Bureau of Statistics
Gladys L. Palmer, University of Pennsylvania

Wednesday, December 28, 1938

—10:00 A.M.—

THE CHANGING CHARACTER OF REAL INVESTMENT OUTLETS

(With the American Economic Association)
Chairman: I. Leo Sharfman, University of Michigan
The Problem of Industrial Growth in a Mature Economy
Ralph J. Watkins and Glenn E. McLaughlin, University of Pittsburgh
The Effect of Current and Prospective Technological Developments upon Capital Formation
David Weintraub, National Research Project
Public Investment in the United States
Morris A. Copeland, Central Statistical Board

CONTRIBUTED PAPERS

(Arranged by the Biometrics Section)
Chairman: Alfred J. Lotka, Metropolitan Life Insurance Company
Quantitative Studies of the Chemical Growth in the Fetal Period
Richard E. Scammon, University of Minnesota
Empirical Equations Representing Linear Growth in the Circumnatal Period
Edith Boyd, University of Minnesota
The Law of Physiological Aging as Derived from Long Range Data on the Refraction of the Human Eye
Felix Bernstein, New York University
The True Growth of the Negro Population in the United States
Bernard D. Karpinos, United States Public Health Service
The Increase in Childless Marriages and the Decline in Large Families, 1920 to 1930
P. K. Whelpton, Central Statistical Board, and Nelle E. Jackson, Scripps Foundation for Research in Population Problems
Discussion: Halbert L. Dunn, Bureau of the Census

Wednesday, December 28, 1938

—10:00 A.M.—

TEACHING OF BUSINESS STATISTICS

(With the Institute of Mathematical Statistics)
Chairman: Theodore H. Brown, Harvard Graduate School of Business Administration
Some Problems in Teaching Elementary Statistics
Lester S. Kellogg, Ohio State University
The Teaching of Graduate Students
Olin W. Blackett, University of Michigan
A Bead-Sampling Machine for Use in the Class Room
Dickson H. Leavens, Cowles Commission for Research in Economics
Discussion: Harry P. Hartkemeier, University of Missouri
Richard L. Kozelka, University of Minnesota

STATISTICAL ANALYSIS OF PUBLIC WELFARE PROBLEMS

(Arranged by the Joint Committee on Relief Statistics)
Chairman: Herman M. Somers, Wisconsin State Department of Public Welfare
The Administrative Use of Time Studies in Public Welfare Agencies
Edward E. Schwartz, Social Security Board
Statistical Guides to Administrative Policy in Public Welfare
Malcolm B. Stinson, Illinois State Department of Public Welfare
A Study of the Adequacy of Relief for Cases Receiving Aid to Dependent Children in South Carolina
A. T. Moore, South Carolina State Department of Public Welfare
Discussion: Grace M. Angle, Social Security Board

—12:30 P.M.—

LUNCHEON OF THE MEMBERS OF THE COMMITTEE ON SOCIOMETRICS

Chairman: George A. Lundberg, Bennington College

—2:30 P.M.—

STATISTICAL METHODS IN GENETICS PROBLEMS

(Arranged by the Biometrics Section and the Institute of Mathematical Statistics)
Chairman: Lowell J. Reed, The Johns Hopkins University
Tests of Simple Mendelian Inheritance in Randomly Collected Data of One and Two Generations
Charles W. Cotterman and Laurence H. Snyder, Ohio State University
Statistical Studies of the Familial Aspects of Cancer in Humans
Herbert L. Lombard, Massachusetts State Department of Public Health
Application of the Method of Likelihood Ratios to the Testing of Hypotheses of Simple Mendelian Inheritance
S. S. Wilks, Princeton University
The Application of Statistical Techniques to Egg Production Data for the Formulation of a Breeding Program
Willard C. Thompson, New Jersey Agricultural Experiment Station

Wednesday, December 28, 1938

—2:30 P.M.—

ROUND TABLE CONFERENCES

(With the American Economic Association)

A. EXPANSION AND CONTRACTION IN THE AMERICAN ECONOMY

Chairman: Stephen M. DuBrul, General Motors Corporation

Is the American Economy Contracting?

Oskar Lange, University of Chicago

The Rôle of the Automobile Industry

Wendell D. Hance, Harvard University

The Outlook for New Industries

Waldo E. Fisher, University of Pennsylvania

B. THE EFFECT OF INDUSTRIAL AND TECHNOLOGICAL DEVELOPMENTS UPON THE DEMAND FOR CAPITAL

Chairman: F. S. Deibler, Northwestern University

How Investment Decisions Are Made

Shelby Cullom Davis, Delaware Fund, Inc.

The Significance of Obsolescence and Depreciation Allowance upon Capital Formation

Henry H. Villard, University of Minnesota

The Changing Character of the Risk Factor in Capital Formation

Rollin F. Bennett, Columbia University

C. THE RÔLE OF PUBLIC INVESTMENT AND CONSUMER CAPITAL FORMATION

Chairman: Roy G. Blakey, University of Minnesota

The Government as Investor

Gerhard Colm, New School for Social Research

The Government as Competitor

Ben W. Lewis, Oberlin College

The Effect of the Social Security Taxes on Consumption and Investment

G. Griffith Johnson, Jr., Treasury Department

D. INCOME AND CAPITAL FORMATION

(With the Conference on National Income and Wealth Research)

Chairman: W. Leonard Crum, Harvard University

The Distribution of Consumer's Income and Expenditures

Hildegarde Kneeland, National Resources Committee

National Income and Capital Formation

Simon Kuznets, National Bureau of Economic Research

An Analysis of Capital Formation as a Guide to Current Policy

George W. Terborgh, Board of Governors of the Federal Reserve System

—3:00 P.M.—

COLLECTION OF SOCIAL DATA

(With the American Sociological Society)

Chairman: Clark Tibbitts, University of Michigan

The Enumerator Factor in the Health Survey

Carl C. Lienau, United States Public Health Service

Limitations of Voluntary Reporting of Social Data

Calvert L. Dedrick, Bureau of the Census

Discussion: Barkev S. Sanders, Social Security Board

Ewan Clague, Social Security Board

A. F. Hinrichs, Bureau of Labor Statistics

Wednesday, December 28, 1938

—8:00 P.M.—

PRESIDENTIAL ADDRESSES
(With the American Economic Association)
Chairman: Frank A. Fetter, Princeton University
R. H. Coats, President, American Statistical Association
Alvin H. Hansen, President, American Economic Association

Thursday, December 29, 1938

—10:00 A.M.—

ROUND TABLE ON BASIC FACTORS IN THE HOUSING MARKET
Chairman: Warren J. Vinton, United States Housing Authority
Population Changes Affecting Housing
Howard Whipple Green, Real Property Inventory of Metropolitan Cleveland
The Pattern of Residential Rents and Land Values in American Cities
Homer Hoyt, Federal Housing Administration
The Relation of Available Dwelling Units to Family Needs and Family Income
Richard U. Ratcliff, University of Michigan
Appraisal of Recent Progress in Housing Surveys
Howard G. Brunsman, Federal Housing Administration

CONTRIBUTED PAPERS
(Arranged by the Biometrics Section)
Chairman: Joseph Berkson, Mayo Foundation
A Statistical Study of Certain Factors Influencing the Accuracy of Estimates of Plankton Populations
C. P. Winsor, Iowa State College
Quantitative Estimation of the Potency of Digitalis by the Cat Method in Relation to Secular Variation
C. I. Bliss and John C. Hanson, The Lilly Research Laboratories
Interpretation of an Inverted Regression Formula and Its Use in Biological Research
Churchill Eisenhart, Wisconsin Agricultural Experiment Station
The Use of the Analysis of Variance in Enumeration by Sampling
W. G. Cochran, Rothamsted Experimental Station, England
On a New Class of "Contagious" Distributions Applicable in Bacteriology and Entomology
J. Neyman, University of California, and G. Beall, Dominion Entomological Laboratory, Chatham, Ontario

—12:30 P.M.—

LUNCHEON MEETING ON THE APPLICATION OF DATA TABULATED BY CENSUS TRACTS TO LOCAL STATISTICAL PROBLEMS
(Arranged by the Committee on Census Enumeration Areas)
Chairman: Howard Whipple Green, Cleveland Health Council
Proposed Tabulations of 1940 Data by Census Tracts
Leon E. Truesdell, Bureau of the Census
Housing Data Needed by Small Areas
Ernest M. Fisher, Federal Housing Administration

Thursday, December 29, 1938

—2:30 P.M.—

ROUND TABLE ON THE MEASUREMENT OF LABOR PRODUCTIVITY
Chairman: Isador Lubin, Bureau of Labor Statistics
The Measurement of the Technological Factor in Labor Productivity
Arthur Wubnig, Railroad Retirement Board
The Purpose and Method of Measuring Productivity
Harry S. Magdoff, National Research Project
Type Problems in the Measurement and Interpretation of Output per Man-Hour
A. F. Hinrichs, Bureau of Labor Statistics
Was There a Productivity Plateau in the Twenties?
Elmer C. Bratt, Lehigh University
Scientific Management and the Measurement of Labor Productivity
Harlow S. Person, New York City

REPRESENTATIVE SAMPLING
(With the Institute of Mathematical Statistics)
Chairman: Harold Hotelling, Columbia University
On the Mathematics of the Representative Method
Allen T. Craig, University of Iowa
Applications of the Theory of Sampling to Large Scale Surveys and Censuses
Frederick F. Stephan, American Statistical Association
New Contributions to the Theory of Sampling
J. Neyman, University of California
Discussion: Samuel A. Stouffer, University of Chicago
Churchill Eisenhart, University of Wisconsin
P. J. Rulon, Harvard University

TAX-EXEMPT SECURITIES
Chairman: Jens P. Jensen, University of Kansas
Estimated Distribution of Tax-Exempt Securities, by Classes of Holders, and the Probable Shifts in Such Distribution Which Would Occur Should the Further Issuance of Such Securities Be Discontinued
Wesley Lindow, Treasury Department
Some Fiscal Effects of the Cessation of Further Issuance of Tax-Exempt Securities
Henry C. Murphy, Treasury Department
Tax-Exempt Securities and Local Finance
Harley L. Lutz, Princeton University
Discussion: Charles O. Hardy, The Brookings Institution
Paul Studenski, New York University

—5:30 P.M.—

SPECIAL SESSION IN MEMORY OF PROFESSOR HENRY SCHULTZ
(With the Econometric Society)
Chairman: W. Leonard Crum, Harvard University
Speakers: Harold Hotelling, Columbia University
Paul H. Douglas, University of Chicago

—8:00 P.M.—

GENERAL MEETING OF THE AMERICAN STATISTICAL ASSOCIATION, INCLUDING REPORT OF BOARD OF DIRECTORS AND ELECTION OF OFFICERS

Friday, December 30, 1938

—10:00 A.M.—

DURABLE CONSUMERS' GOODS AND THE BUSINESS CYCLE

Chairman: Willford I. King, New York University

Postponable Purchasing of Durable Consumers' Goods and the Business Cycle
Charles S. Tippetts, University of Pittsburgh

The Replacement Demand for Durable Consumers' Goods
Edwin B. George, Dun & Bradstreet, Inc.

Price Reduction as a Stimulus to Sales of Durable Consumers' Goods
Don D. Humphrey, Works Progress Administration

Discussion: Simon Kuznets, National Bureau of Economic Research
Edward S. Mason, Harvard University
Edwin G. Nourse, The Brookings Institution

USES OF STATISTICS IN THE MANAGEMENT OF DISTRIBUTIVE BUSINESSES

(With the American Marketing Association)

Chairman: David R. Craig, American Retail Federation

The Scientific Marketing of Consumer Goods
Sidney Hollander, Jr., Maryland Pharmaceutical Products Corporation

Statistical Problems in Food Distribution
Ralph B. Sharbrough, The Great Atlantic & Pacific Tea Company

Analyzing the Sales Interview
Donald R. G. Cowan, Swift & Company

SOCIAL STATISTICS

Chairman: Samuel A. Stouffer, University of Chicago

Determining the Popularity of Radio Programs
Frank Stanton, Columbia Broadcasting System

The Measurement of Culture
Thomas C. McCormick, University of Wisconsin

Current Vital Statistics Reports for the United States
Forrest E. Linder and Robert D. Grove, Bureau of the Census

—10:30 A.M.—

THE SAMPLE CENSUS OF AGRICULTURE

(With the American Farm Economic Association)

Chairman: W. F. Callander, Bureau of Agricultural Economics

Developments Arising out of the Trial Census Work in 1938
Z. R. Pettet, Bureau of the Census

Development of Partial and Sample Census Methods
Charles F. Sarle, Bureau of Agricultural Economics

Results of Four Methods of Sampling Individual Farms
Irvin Holmes, Bureau of Agricultural Economics

Discussion: R. L. Gillett, New York State Department of Agriculture and Markets
Calvert L. Dedrick, Bureau of the Census
T. W. Schultz, Iowa State College

Friday, December 30, 1938

—2:30 P.M.—

PRICE POLICIES AND THE BUSINESS CYCLE

Chairman: Morris A. Copeland, Central Statistical Board
Producers' Goods Prices in Expansion and Decline
Lloyd G. Reynolds, Harvard University
The Prices of Consumers' Goods in Expansion and Recession
Henry B. Arthur, Swift and Company
Public Utility Prices and the Business Cycle
John D. Sumner, University of Buffalo
Discussion: Isador Lubin, Bureau of Labor Statistics
Edward W. Morehouse, Public Service Commission of Wisconsin

UNEMPLOYMENT COMPENSATION

(With the American Association for Labor Legislation)
Chairman: George E. Bigge, Social Security Board
Suggested Changes in Unemployment Compensation
Eveline Burns, Columbia University
Recent Developments in Merit Rating
Herman Feldman, Amos Tuck School of Administration and Finance, Dartmouth College, and Donald Smith, Railroad Retirement Board
Discussion: Edgar Z. Palmer, Kentucky Unemployment Compensation Commission
Collis Stocking, Social Security Board
Charles V. Kidd, Princeton University
Clarence A. Kulp, University of Pennsylvania
Frank B. Cliffe, General Electric Company

—6:30 P.M.—

DINNER MEETING—THE OUTLOOK FOR 1939

Chairman: Willford I. King, New York University
Speakers: Laurence H. Sloan, Standard Statistics Company
Lionel D. Edie, Lionel D. Edie & Company
Leonard P. Ayres, The Cleveland Trust Company

Minutes of the Annual Business Meeting

The American Statistical Association convened for the one-hundredth annual business meeting at 8:00 P.M., Thursday, December 29, 1938, at the Book-Cadillac Hotel in Detroit, Michigan. Vice-President Halbert L. Dunn presided.

The minutes of the ninety-ninth annual business meeting were approved as published in the JOURNAL.[1]

The Secretary read the Annual Report of the Board of Directors.[2]

It was voted to express to Ralph J. Watkins the cordial appreciation of the members of the Association for his services as Review Editor of the JOURNAL during the past four and one-half years.

In discussing the Report of the Board of Directors, several members pointed out the desirability of bringing into the Association more of the many statisticians who are not now members but who are interested in the work that the Association is doing and willing to help to support it. It was proposed that the Directors consider the advisability of establishing a class of Associate Members subject to certain restrictions and with a lower rate of dues. It was also suggested that the dues of some classes of members might be increased.

The Secretary reported that the Committee on Fellows had no elections to announce. The Committee must conduct its business by correspondence. The correspondence had been initiated late in the year and the Committee had not completed its selection in time for announcement at the Annual Meeting.

The Secretary read the report of the Nominating Committee and stated that he had received no nominations by petition. It was voted to instruct the Secretary to cast one ballot for the nominees presented by the Committee on Nominations. The ballot was cast and the following officers and directors were elected:

President RAYMOND PEARL, The Johns Hopkins University

Vice-Presidents

Collection and Classification of Data, and Administration of Statistical Agencies
O. C. STINE, Bureau of Agricultural Economics

Statistical and Actuarial Methods and Technique, and the Teaching of Statistics
ALFRED J. LOTKA, Metropolitan Life Insurance Company

Facts and Methods Pertaining to Sociology, Social Welfare Problems, and Labor Statistics
EWAN CLAGUE, Social Security Board

Facts and Methods Related to Biometry, Vital Statistics, Psychology, and Education
JOSEPH BERKSON, Mayo Clinic

[1] This JOURNAL, 33 (March 1938), 188.
[2] This JOURNAL, p. 155.

Facts and Methods Bearing upon Economics and Economic Theory
J. FREDERIC DEWHURST, The Twentieth Century Fund
Facts and Methods Pertaining Primarily to Business
ROBERT W. BURGESS, Western Electric Company
Facts and Methods Pertaining to Financial Institutions
WILLIAM J. CARSON, University of Pennsylvania
Facts and Methods Pertaining to Marketing
VERGIL D. REED, Bureau of the Census

Directors (For terms expiring at the close of the Annual Meeting in 1941)
F. LESLIE HAYFORD, General Motors Corporation
WALTER W. STEWART, Institute for Advanced Study

Director (For the remainder of the term expiring at the close of the Annual Meeting in 1940, left vacant by the resignation of W. Randolph Burgess)
HALBERT L. DUNN, Bureau of the Census

Secretary-Treasurer
FREDERICK F. STEPHAN, American Statistical Association

The following resolutions were adopted.

Resolved, That the members of the American Statistical Association express to R. H. Coats their deep appreciation of his leadership as President during 1938, and extend congratulations and thanks to him and to the Vice-Presidents, Theodore H. Brown, Burton H. Camp, David R. Craig, Halbert L. Dunn, Ralph C. Epstein, Charles O. Hardy, Isador Lubin, and Samuel A. Stouffer, for arranging the excellent program of this, the One-hundredth Annual Meeting.

Resolved, That the American Statistical Association expresses its gratitude and appreciation to Andrew T. Court, its representative on the Joint Committee on Local Arrangements, and to George R. Husband, Chairman of that Committee, for their painstaking work in making the local arrangements essential to the success of this Annual Meeting.

Resolved, That the American Statistical Association warmly thanks the management and employees of the Book-Cadillac Hotel for the fine hospitality which they provided to members of the Association attending the Annual Meeting in Detroit.

It was suggested that the importance of agricultural statistics might well be recognized by designating a Vice-President for this field or including it in the responsibilities of one of the present Vice-Presidential offices.

It was voted to commend the efforts of the Albany Chapter to forward the establishment of professional standards of statisticians.

Thanks were expressed to the Secretary for his part in the preparations of the Annual Meeting and in the activities of the Association throughout the year.

The meeting was adjourned.

FREDERICK F. STEPHAN, *Secretary*

Report of the Board of Directors

Continuing the practice established at the last Annual Meeting, we wish to present to the members of the American Statistical Association a brief review of the Association's activities during 1938.

Meetings: This is our One-hundredth Annual Meeting. Our First Annual Meeting was held in Boston on February 5, 1840, only two months after our Association was organized. Later, the time of our annual meetings was advanced to January and then to the last week in December. As a result of that change, our One-hundredth Annual Meeting is being held almost a year in advance of our one-hundredth anniversary and, consequently, no provision has been made for the celebration of our centenary at this Annual Meeting. Plans are being made for an appropriate celebration of this important event in a series of special meetings starting with the observance in Boston next November of the anniversary of the Association's founding, continuing with a special program in connection with the Annual Meeting in Philadelphia a year hence, and culminating in a celebration in Washington in 1940 in conjunction with the International Statistical Institute.

Our President and Vice-Presidents have prepared for us, with the advice and assistance of the Secretary, several of our Committees, and many members of the Association, an elaborate program matching in its variety and interest the programs of previous years. In accordance with our custom, we are sharing the sponsorship of a number of sessions with our kindred associations.

A special meeting of the Association was held in Ottawa, Canada, last June in connection with the summer meetings of the American Association for the Advancement of Science. This meeting provided a unique opportunity for Canadian and American statisticians to share their experience and become better acquainted with each other's views. In addition to the regular sessions there were several informal meetings for the discussion of the comparability of certain statistics in Canada and the United States. The program consisted of sessions on "Economic Relations of Canada and the United States," "The Business Outlook with Special Reference to Government Spending," "Retail and Wholesale Trade," and a joint session with the Canadian Agricultural Economics Society and the Canadian Society of Technical Agriculturalists on "Weather and Crop Yields."

The Biometrics Section: At the last Annual Meeting, an amendment to the Constitution was adopted which provided for the organization of sections. On April 14, 1938, the Board of Directors established a Biometrics Section to be responsible for planning meetings on various biometric subjects including applications of statistics in biology and medicine, and vital statistics. The Committee on Biometrics which had been active during the preceding two years was continued as the Biometrics Section Committee. The Biometrics Section has arranged a series of four sessions in connection with this Annual Meeting, one of which is a joint session with the Institute of Mathematical Statistics.

Chapters: Members of the Association are finding in our chapter meetings increasingly interesting opportunities for the discussion of statistical subjects. The programs of these meetings have been reported in the JOURNAL. In addition to meetings, some of the chapters have had committees at work, noteworthy among which was the Albany Chapter's Committee on Salary Grades for Statistical Workers, which prepared and presented to the appropriate State authorities an excellent report on professional standards for statistical workers, with especial reference to statisticians employed in the departments of the New York State Government. We will refer to this report in another connection.

During the year chapters of the Association were established in Madison, Wisconsin, and Detroit, Michigan. The latter Chapter includes within its district Ann Arbor, Michigan, and Toledo, Ohio. Both Chapters illustrate in their membership the fruitfulness of collaboration between statisticians in the universities, in business, and in government which is characteristic of the Association. The activities of the chapters are a very vital part of our Association, and we acknowledge our indebtedness to the chapter officers and district representatives who have been responsible for their success.

Committees: The Association has a number of administrative committees including the Committee on Fellows, the Committee on Nominations, and the Committee on Investments. The work of these Committees is of great importance and the Association is indebted to the members who have served on them.

The Association also has committees at work in a number of fields of statistics. For the most part, their accomplishments consist of providing constructive criticism and advice to government agencies engaged in the collection and analysis of statistics, stimulating new statistical projects, and encouraging the improvement of current statistical work. They provide opportunities for consultation and conference to members of the Association who are responsible for the development of statistics in their respective fields. The effectiveness of the committees depends upon the willingness of their members to devote their time and efforts to making necessary preparations for committee meetings and to following up recommendations quite as much as it does upon their attendance at the meetings. The many members who have served on these committees and carried forward their work have made very valuable contributions to statistics and to the Association.

The Committee on Committee Organization and Activities, consisting principally of the Committee chairmen, met in March to review the progress made by these Committees during the preceding year and formulate recommendations to the Board of Directors for the year to come.

The Advisory Committee on the Census held three regular two-day meetings in Washington during the year to consider problems presented to it by the Director of the Census with respect to preparations for the Census of 1940 and other problems within the scope of its responsibility. A special meeting was held in New York in the spring. The first meeting of the year

included a joint meeting with the Committee on Labor Statistics to discuss common problems relating to employment and occupational statistics.

The Committee on Census Enumeration Areas had conducted a considerable correspondence with the census tract cities and it has arranged a conference in connection with this Annual Meeting.

On the invitation of the Census Bureau, the Association joined with the American Marketing Association and the United States Chamber of Commerce in appointing a Committee on Metropolitan Districts. This Committee met twice during the year and is conducting extensive correspondence with local cities in each metropolitan district.

The Committee on Statistics of Delinquents and Criminals has arranged a conference in connection with this Annual Meeting consisting of a round table session on the "Collection and Compilation of State Criminal Statistics" and a round table on "Standard Classifications Used in Criminal Statistics." A special effort has been made to urge the attendance at these sessions of state statisticians responsible for criminal statistics.

The Joint Committee on Relief Statistics, of which the American Public Welfare Association is also a sponsor, met six times during the course of the year for consideration of problems and projects in its field and the discussion of reports of the subcommittees through which much of its work this year has been accomplished. The Committee issued during the year five numbers of its informal *Bulletin of Information for Relief Statisticians*, copies of which were distributed to a mailing list of approximately 500 agencies or persons. A series of papers on relief statistics was inaugurated at the beginning of the year and six brief papers were published in the series. Copies of these papers were distributed to members of the Association interested in welfare statistics. The Committee arranged conferences on relief statistics in connection with the meetings of the National Conference of Social Work in Seattle in June, and the American Public Welfare Association in Washington early in December. The Committee also arranged a session on "Statistical Analysis of Public Welfare Problems" in connection with this Annual Meeting. At the request of the Social Security Board, the Committee has continued to act as the official advisory committee of its Division of Public Assistance Research.

The Committee on Statistics of Institutions for Mental and Physical Disorders met twice during the year and discussed some of the problems connected with the proposed New York State census of patients in state mental hospitals.

The Committee on Labor Statistics met in New York in June for an entire day and discussed in detail the problems connected with occupational classification for statistical purposes and the relationship of employment and payroll statistics to the statistics that are being derived from the unemployment compensation systems. It appointed a subcommittee to study the former and invited Dr. Ralph G. Hurlin to make a special study of the latter. The Central Statistical Board was invited to join in sponsoring the

Committee on Occupational Classification and accepted this invitation. The Committee on Occupational Classification in turn established a technical subcommittee which has met very frequently and has made very substantial progress on this very difficult problem. The principal Federal agencies concerned with occupational statistics are represented on the Committee and its technical subcommittee and are cooperating very effectively in conducting this work. A more detailed account of the organization of the Committee was presented in the December *Bulletin*.

The Joint Committee on Income Tax Statistics which the Association sponsors with the American Economic Association was enlarged during the year to include representatives of the American Institute of Accountants. The Committee has considered a number of suggestions for the revision of the tabulations in *Statistics of Income* and through its Chairman it has been in close touch with the Treasury Department.

At the beginning of the year, a Committee on the Use of Statistics in Company Management was appointed. The Committee met in February, and in May held a small conference meeting with a number of business statisticians.

Through its representatives, the Association participated in the work of the Social Science Research Council, the National Bureau of Economic Research, the American Association for the Advancement of Science, the Business Research Council, the National Conference on the Nomenclature of Disease, the Joint Committee for the Development of Statistical Applications in Engineering and Manufacturing, the Sectional Committee on Standards for Graphic Presentation, the Conference on National Income and Wealth, the New York Management Council, and the American Documentation Institute. Of particular interest to statisticians is the completion of a booklet on "Time Series Charts—a Manual of Design and Construction" which was approved and published by the American Standards Association in November as an "American Standard."

Publications: Volume 33 of the JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION, published during 1938, was similar in size and content to other recent volumes. About as many pages were devoted to papers presented at the last Annual Meeting as have been devoted to these papers during the last ten years. At the last Annual Meeting it was suggested that the Association call attention to the dangers of misusing statistics. The December issue carried as a leading article a discussion of some instances of the misuse of statistics, and future issues may present a further discussion of this subject.

Dr. Ralph J. Watkins has submitted his resignation as Review Editor of the JOURNAL as of the end of this year. During the four and one-half years in which he has served as Review Editor, this section of the JOURNAL has been especially interesting. The number of pages devoted to reviews has been doubled. He has performed well the arduous work of Review Editor and it is appropriate that we express our appreciation to him.

Three years ago, an informal bulletin was instituted on an experimental basis. At the beginning of this year, it was decided to issue the *American Statistical Association Bulletin* regularly in February, May, November, and December. An application was filed for mailing it at second-class rates and the resulting saving in postage approximately covers the cost of printing one issue each year. While we do not have funds with which to publish the *Bulletin* at very frequent intervals, it is becoming more and more valuable as a vehicle for announcements, informal reports, and other communications.

Membership: During 1938 the membership of the Association increased from 2,044 members to 2,128. The increase in membership was only half of that recorded in 1937 and two-thirds of the increase during 1936. This was not due to a falling off of applications for membership; the number of applications received in 1938 was equal to the average for 1936 and 1937. Our growth was smaller this year because we lost more members by death, by resignation, and by failure to continue the payment of dues than we did in 1936 or 1937. (To a considerable extent, this reflects the unfavorable economic conditions that have prevailed since the middle of 1937. The number of subscriptions to the JOURNAL showed a similar slackening in its rate of increase.) Many members of the Association have nominated candidates for election to membership in the Association. We hope that they will continue to show this interest in developing the membership of the Association and that they will be joined by other members who did not submit nominations during 1938.

Finances: During the year, the Association received $4,500 from The Rockefeller Foundation under a special grant which was made in 1935 to enable the Association to strengthen its headquarters organization, to maintain contact with government statistics, and to develop its committee work. The financial support given to the Association's activities by this grant has been a very substantial factor in the Association's accomplishments during the past year. This grant continues through 1940 in amounts that diminish at the rate of $1,500 each year.

The Association's income from dues and subscriptions was increased a little more than $400 in comparison with last year, but our income from advertising, the sale of old numbers of the JOURNAL, and dividends and interest was reduced by more than $1,100. As a consequence, although our expenses were reduced by $1,000, we have a deficit this year of almost $1,200. Arrangements have been made to reduce our expenditures for rent next year and to effect other economies where that is possible without serious injury to the work of the Association, but our principal effort to balance our budget in 1939 should be in the direction of increasing our income. If economic conditions improve, that will help, but an extra effort on the part of many members of the Association is needed.

As we approach our centenary, it is quite appropriate that we seek to secure a number of Contributing Members. In 1938 we had but two and in

1937 only four. We should have at least twenty members who will assume responsibility for more than the regular dues by becoming Contributing Members. We should also seek to enlarge our group of Corporate Members, of whom there are five. Through our activities in fostering the professional development of our members and seeking the improvement of statistical data and methods, the work of the Association inures to the benefit of banks, insurance companies, manufacturing establishments, business houses and other organizations that may well give support to these activities by becoming Corporate Members. Every Regular Member or Fellow can help in securing new members and new subscribers to the JOURNAL. It is hoped that in the course of time the Association may receive special gifts for current operations or for special projects from members who are in a position to make such gifts.

A Study of Statistics and Statistical Work: As the use of statistics is extended and developed, it is natural that increasing emphasis should be given to the qualifications of statisticians, the special abilities that enable them to perform a unique service as statisticians. Increasing emphasis is placed upon training for statistical work and on standards of quality that should be met in statistical work. At the last Annual Meeting the question was asked, "What is a statistician?" and in the May *Bulletin* this question was presented to members for their comments. From a number of sources, it has become evident to the officers of the Association that we should undertake to formulate a definite statement of the qualifications of statisticians and the functions that they may be expected to perform. The work of the Albany Chapter on this problem which was mentioned earlier in this report is a very important step in that direction. It may prove to be desirable to concentrate at first on statistical positions in the Federal and state governments. Before the work is completed, however, it will be necessary to study statistical work in private organizations and the training of statisticians. Such a study cannot be completed in a short time. A committee is being appointed to plan this project. The cooperation of members of the Association is especially desired in bringing to our attention information that will be helpful to this committee.

During the one hundred years that have elapsed since our Association was organized, we have grown to become a truly national organization, we have established our chapters and committees, and we have played an important part in the development of American statistics. Our work is not completed; on the contrary, it seems that we have only begun. We will continue to make progress next year and in the years to come.

Report of the Secretary

Most of the activities with which the Secretary has been concerned are included in the Report of the Board of Directors. It is customary for the Secretary to report certain statistics about the membership of the Association. During 1938 the membership roll increased from 2,044 to 2,128, a net growth of 84 members. During the year 232 new members were elected, and 20 former members were reinstated. One hundred and two members were removed from the membership roll for failure to pay their dues, 19 of whom were reinstated before the end of the year. Seventy-one members were lost by resignation and 14 by death. At the end of the year 30 applications for membership beginning January 1, 1939, had been received.

Membership Statement, December 31, 1938

Honorary members	17
Corporate members	5
Fellows	88
Regular members	2,018
Total membership	2,128

One Fellow and one Regular Member were Contributing Members during 1938. Two members became Life Members during the year, bringing the total number of Life Members to 36.

The death of the following members was recorded during the year: P. I. Georgievsky and Eugene Würzburger, Honorary Members; Kate H. Claghorn, Joseph A. Hill, Henry Schultz, and George F. Warren, Fellows; George E. Barnett, Edward Berman, John E. Coover, C. Luther Fry, Harry Jerome, G. R. Lamson, Cordt Trap, and Edward B. White, Regular Members.

FREDERICK F. STEPHAN, *Secretary*

Report of the Treasurer

While 1938 was a year of progress for our Association in its various activities, it was an unsatisfactory year from the standpoint of finances. The membership and subscription lists increased during the year but less rapidly than they had in 1937. There was a sharp reduction in receipts from the sale of old numbers of the JOURNAL and in dividends and interest. All the ordinary items of income were affected by the unfavorable economic conditions that prevailed during most of the year and consequently it was not possible to offset by increases in these ordinary items the annual decrease in the amount of The Rockefeller Foundation grant. In spite of a substantial reduction in expense, a deficit of approximately $1,250 was incurred.

During the year there was a substantial increase in the market value of the securities held by the Association. On the securities sold during the year a loss of $2,612 was realized, more than $2,000 of which was on certain shares mentioned in the Treasurer's Report for 1937 which were acquired in 1892 and 1893. The proceeds and the cash balance remaining from the sale of securities in 1937 were reinvested in accordance with the orders of the Committee on Investments, except $2,000 which was deposited in a savings account at the direction of the Committee.

It has been customary to show in the Treasurer's Report a statement of net cash receipts and expenditures. Beginning with the report for 1935, the Treasurer has presented a balance sheet on an accrual basis. With this report the transition is made from a statement of receipts and expenditures to a statement of income and expense. The increasing scope and complexity in the Association's activities and the requirements of budgeting have made this change desirable.

The balance sheet and statement of the income and expense with comparative figures for 1937 are given in the Auditors' Report.

FREDERICK F. STEPHAN, *Treasurer*

Report of the Auditing Committee

The accounts of the American Statistical Association for the fiscal year 1938 have been audited by Price, Waterhouse & Co. We have read the report of the audit and subject to the limitations as set forth therein we concur in the report and transmit it herewith.

ERNEST M. FISHER
DONALD S. THOMPSON

February 25, 1939

To the Board of Directors of
American Statistical Association

We have made an examination of the balance sheet of American Statistical Association as at December 31, 1938 and of the related statements of income and surplus for the year ending on that date. In connection therewith, we examined or tested accounting records of the Association and other supporting evidence and obtained information and explanations from officers and employees of the Association. The recorded cash receipts for the year 1938 were traced to the deposits shown on the bank statements and the amounts for dues and subscriptions were tested in total with the membership and subscription records. The paid checks and relative vouchers were inspected in support of the cash disbursements for the year. The cash balances and the securities owned at December 31, 1938 were confirmed by inspection or by certificates from the depositaries. We also made a general review of the accounting methods but we did not attempt to check the mailing lists with the membership and subscription records or make any independent verification of the inventory of old journals, the office records of which are based in part on data assembled in prior years, no recent physical inventory having been taken.

In our opinion, based upon such examination, the accompanying balance sheet and related statements of income and surplus fairly present the position of the Association at December 31, 1938 and the results of its operations for the year.

PRICE, WATERHOUSE & Co.

AMERICAN STATISTICAL ASSOCIATION
BALANCE SHEETS

	December 31, 1937	December 31, 1938
Assets		
Cash in bank and on hand	$ 4,994.64	$ 2,150.42
Accounts and interest receivable	69.25	40.88
Investments, at cost (at market quotations $5,391.75 and $8,054.01, respectively)	9,709.48	8,861.67
Inventory of old journals, at approximate cost applied to saleable quantities	1,578.28	1,740.23
Furniture and equipment, at cost less depreciation	582.16	499.07
Prepaid expenses		103.19
	$16,933.81	$13,395.46
Liabilities		
Accounts payable	$ 20.16	$ 267.00
Special account—Allied Social Science Association	128.44	261.23
Life membership reserve	2,276.10	2,381.69
Unearned income:		
Dues	1,013.75	862.00
Subscriptions	1,637.00	1,633.50
Surplus, per statement	11,858.36	7,990.04
	$16,933.81	$13,395.46

AMERICAN STATISTICAL ASSOCIATION
INCOME STATEMENTS

	Year ending December 31, 1937	1938
INCOME:		
Dues—current year	$10,288.75	$10,687.25
Dues—prior years	60.50	59.00
Life memberships (see note)	235.10	185.45
Subscriptions	3,414.50	3,498.00
Advertising	389.20	338.55
Reprints	145.15	311.40
Journal sales	791.38	269.83
Special publications	72.47	33.20
Miscellaneous	155.31	131.05
Dividends and interest (after deducting $81.20 in 1937 and $91.04 in 1938 apportioned to life membership reserve)	766.42	196.27
	$16,318.78	$15,710.00
The Rockefeller Foundation grant	6,000.00	4,500.00
	$22,318.78	$20,210.00
EXPENSES:		
JOURNAL—printing, mailing and reprints	$ 5,183.25	$ 5,014.18
Bulletin	561.14	516.30
Salaries and wages	11,728.30	11,798.64
Unemployment compensation tax	245.45	349.45
Rent	1,080.00	1,113.00
Office supplies, printing and mimeographing	1,014.93	628.34
General postage and carriage	569.72	487.21
Telephone and telegraph	213.54	225.47
Travel expense—officers	1,041.95	607.21
Travel expense—committees	310.70	161.75
Mimeographing—committees	47.25	46.87
Storage of old JOURNALS	82.47	72.00
Cost of old JOURNALS sold	146.86	32.40
Miscellaneous expense	422.65	322.30
Depreciation of furniture and equipment	102.74	88.07
	$22,750.95	$21,463.19
Excess of expenses over income	$ 432.17	$ 1,253.19

Note:

In accordance with a resolution of the Board of Directors, March 31, 1936, the life membership reserve is computed on the basis of the combined

AMERICAN STATISTICAL ASSOCIATION

SURPLUS STATEMENT

YEAR ENDING DECEMBER 31, 1938

Balance previously reported at December 31, 1937 on the basis of investments at market quotations on that date		$ 7,597.35
Add:		
Adjustment to restore investments to cost as at December 31, 1937		4,317.73
		$11,915.08
Deduct:		
Adjustment of estimated assets at December 31, 1937:		
Inventories as estimated	$ 1,535.00	
Dues receivable, estimated	100.00	
	$ 1,635.00	
Less—Inventory of old JOURNALS at approximate cost applied to saleable quantities	1,578.28	56.72
Adjustment balance December 31, 1937, per balance sheet		$11,858.36
Deduct:		
Excess of expenses over income for the year ending December 31, 1938, per income statement	$ 1,253.19	
Loss on sale of securities acquired in prior years, computed on the basis of cost	2,612.00	
Loss on sale of fractional share of stock received as dividend in 1938	3.13	3,868.32
Balance December 31, 1938		$ 7,990.04

annuity table of mortality with assumed interest at 4% per annum and an assumed annuity of $5.00 per life member. The amount treated as income in each year represents the excess of the reserve at the beginning of the year plus interest for the year and new life membership receipts over the required reserve at the end of the year.

*Reports of Committees and Representatives: Report of the Biometrics Section Committee**

The active direction of the activities of the Section during 1938 was placed in the hands of a committee of three: Professor Lowell J. Reed, The Johns Hopkins University, Chairman, Mr. George W. Snedecor, Iowa State College, and Dr. Joseph Berkson, Mayo Clinic, Secretary, by a resolution adopted by the Committee on Biometrics at the meeting of the Association in Atlantic City in December, 1937.

In accordance with previously declared aims, the activities of the Committee were concerned with the preparation of a program of biometric interest to be conducted under the auspices of the Biometrics Section at the Association meeting of December, 1938. The program was arranged on the dual plan of (1) having individuals responsible for the suggestion and execution of a session on some particular subject and (2) having some sessions consisting of papers voluntarily contributed.

Dr. Wilks suggested and organized a session, under the joint auspices of the Institute of Mathematical Statistics and the Biometrics Section, devoted to statistical aspects of investigations in genetics. Mr. Snedecor suggested and organized a session devoted to a description of the statistical aspects of experiments in the evaluation of an insecticide. The Secretary of the Committee wrote to a group of individuals asking for voluntary papers. The response was gratifyingly good, and from the offered papers enough were selected to provide for two sessions.

The plan of operation for the preparation of a program followed in 1938 seems to be satisfactory, and it is recommended that it be continued for the next year. A suggestion has already been made by Professor Reed that a session at the 1939 meeting be devoted to statistical methods associated with population problems, under joint auspices with the Population Association of America. The Secretary has kept a mailing list of individuals belonging to the American Statistical Association and others who are interested in biometrics work, and it is suggested that this list be used in canvassing for contributed papers for the 1939 meeting.

It is also suggested that this list might perhaps be used for some publicity announcement during the course of the year to advance an interest in the activities of the Biometrics Section.

JOSEPH BERKSON, M.D., *Secretary*

* The Committee on Biometrics which was appointed in the fall of 1935 was continued as the Biometrics Section Committee when on April 14, 1938, the Board of Directors took action to establish a Biometrics Section. This was the first section to be created under the amendment to the Constitution, authorizing the establishment of sections which was adopted at the Ninety-ninth Annual Meeting. (See the announcement in the May 1938 *Bulletin*.)

Report of the Advisory Committee on the Census

The Census Advisory Committee has completed its second year since reorganization as a Committee of the American Statistical Association exclusively instead of being, as formerly, a joint committee of that Association and the American Economic Association. As defined by the Board of Directors, its primary function "is to advise with the Director of the Census either on his own initiative or that of members of the committee with a view to promoting improvements in census procedures and data. It is authorized to consider means of improving conditions bearing upon the effectiveness of census procedures which may be beyond the power of the Director to alter, to make relevant recommendations, and to transmit these to the Director of the Census, the Board of Directors of the Association, or both. It is invited to bring to the attention of the Board, with its recommendations, any matters on which it believes that the American Statistical Association should take an official position. Except on instructions by the Association or its Board of Directors, the Committee is not authorized to speak for the Association as such."

Three meetings of the Committee have been held during the past year—the first on January 7, the second on June 17 and 18, and the third on September 30 and October 1. Only one absence at these meetings was recorded and that for an unavoidable reason. Dr. Willard L. Thorp was the new member of the Committee. On January 8, following the first meeting of the Committee in Washington, a joint session with the Association's Committee on Labor Statistics was held, for the purpose of discussing some problems common to the work of both committees, especially concerning the collection and handling of the occupational statistics of the 1940 Census.

The most important work of the Committee during the year concerned the preparations for the Sixteenth Census in 1940. At the January meeting it was reported that legislation drafted by the Bureau and previously considered in detail by the Committee, providing for the 1940 and other censuses, still awaited approval by the Budget Bureau before the bill could be submitted to Congress.

The exact form of questions on the 1940 schedules was left for later discussion but the general scope and content of the Census was considered. As a result of social changes, economic status inquiries become increasingly important as contrasted with the declining significance of questions such as country of birth of the parents. The importance of detailed information on housing, in addition to value and rental of homes now included on the population schedule, raises the issue as to the need for a housing census taken separately from population. Employment status will be a matter of major interest.

The Bureau, in preparation for the agricultural census of 1940, is using a trial schedule in the field, handled by the staff of the Department of Agriculture. The completed schedules are being returned to the Bureau and are treated in the same manner as at the time of the regular census. This experi-

ment will show how the questions and instructions work in the field. The final schedules will be revised in the light of this information. It is planned to try out the population schedule in a similar manner, especially testing certain new inquiries proposed for the 1940 schedule, such as mobility, work place, income, employment status, etc.

At the June meeting of the Committee the questions proposed for the population schedule of the 1940 Census were considered in detail. The Bureau took the position that the 1930 schedule was as detailed as could be handled with the expected appropriation. Therefore, it would be necessary to displace old inquiries, if new questions are to be included on the 1940 schedule. Various new proposals, or old questions in modified form, were considered—work place, mobility (question as to place of residence at a preceding date to indicate migration), rooms per family and other housing questions, income of families or individuals (perhaps in lieu of value and rental of homes), religious affiliation, last grade of school completed (as a substitute for present questions on illiteracy), number of children ever born (for studies of relative fertility—possibly on a sampling basis), class of worker, employment status, and occupation and industry classifications.

In connection with this discussion of new proposals the various possible or desirable omissions of old inquiries were considered. It was emphasized again that sampling methods used in certain types of inquiries would lighten the pressure on the general population schedule, and that a quinquennial enumeration of population would enable the Bureau to alternate certain inquiries which need not be repeated at every census.

At the September meeting the Director requested advice on his proposal for special advisory committees on Population, Agriculture, Distribution, and Manufactures, to be appointed by the Secretary of Commerce, including representatives of Federal agencies and qualified persons outside the government service. The plan is to have each committee consider all suggestions and recommendations submitted either by government agencies or by outside organizations and individuals; and to request each committee to recommend the subject matter and tentative questions for the schedules. These recommendations will serve as a basis for drafting the schedules and instructions by the technical staff of the Bureau, which will be submitted at the proper time to the Central Statistical Board. Finally, all recommendations regarding schedules or other matters will be passed upon by the Census Advisory Committee at the request of the Director. The special committees will be asked to accompany their recommendations with arguments for or against the inclusion or exclusion of specific inquiries.

After discussion the Committee unanimously approved the proposal as outlined above and recommended that each special committee, except that for Agriculture, should consist of five members, one of whom should be a representative of the Central Statistical Board; that the other members should be persons outside the government service; that the chairman of each should be one of the outside members; and that the Bureau should provide a staff adviser to each committee who shall act as its secretary.

The Committee, at the request of the Director, before the end of October, submitted a carefully considered list of qualified persons in the fields of Population, Distribution, and Manufacture (membership of Agriculture's committee already agreed upon), from which appointments might be made. The Committee also offered to the Director a tentative general statement as to the scope within which the special committees might be expected to carry on their work, emphasizing certain principles and limitations which should be considered in arriving at their decisions—this statement in some form designed to accompany the invitation to serve on the special committees.

Better utilization of the census data collected was considered by the Committee at two of its meetings. To accomplish this involves careful planning of cross-classifications and tabulations useful for research purposes; it requires allocating a definite proportion of the census funds for analytical work; and it will need some highly qualified and experienced personnel in the Bureau for the additional work required, at the earliest possible time. At the June meeting the Committee urged these objectives upon the immediate attention of the Bureau and stressed the point that this sort of planning is important now, because it really affects the schedule of inquiries finally adopted. If funds are limited it might be better to curtail the schedule in order to set aside more adequate funds than has been the custom for analytical work. Especially every new item included in the schedule should be considered from the viewpoint of utilization of the data—even table forms and related classifications might well be drawn up before the schedule is finally adopted. Dr. Ogburn, because of his special interest in the subject, was requested to serve as a sub-committee to consider these problems, with the object of continuing the discussion at the next meeting of the Committee. The cooperation of the staff of the Bureau was enlisted in furnishing the materials needed.

At the September meeting the Committee sought an answer to the question as to what proportion of the census funds should be earmarked for analytical purposes. A functional analysis of the amounts spent at previous censuses, 1920 and 1930, would be required in order to make any intelligent recommendation on this point. The request for this information was embodied in the following resolutions unanimously adopted:

> *Resolved*, That the Census Advisory Committee recommend to the Director that a more refined and extensive analysis of the materials of the 1940 Census be made, in addition to the customary tabulations, and that plans be undertaken now to that end.
>
> *Resolved*, That the Director be requested to discuss with the Committee the allocation of an adequate sum for analysis of the 1940 data, and that for this purpose he present to the Committee a functional analysis of the costs of the 1920 and 1930 censuses, in addition to the subject analysis already presented.

The *Statistical Abstract* will be issued in the future under the supervision of the Census Bureau. At the June meeting the Committee was requested to

consider an elaborate memorandum suggesting extensive changes in the forthcoming 1938 edition. After discussion the Committee unanimously recommended that this first issue by the Bureau be published substantially in the old form, with a minimum of changes.

The Committee further recommended to the Director the development of a suitable type of advisory arrangement to consider the changes and additions which should be made in later issues of the *Statistical Abstract*.

At the September meeting this advisory arrangement was considered again with the object of arriving at a more definite plan. The desirability of contacting the statistical producing agencies of the Federal government was emphasized, for the purpose of determining what materials should be included and the form of publication. A canvass of some of the chief users of the *Abstract* was suggested, to determine what sections of the material are most in demand. Suggestions for improving the index to the volume were made. References in footnotes to the more complete sources of the data included were recommended, even noting some of the chief breakdowns to be found in these sources.

Finally, a resolution was adopted recommending the appointment of a committee to cooperate with the Bureau in the development of the *Statistical Abstract*.

At the June meeting certain resolutions and recommendations of Special Advisory Committees, that on Financial Statistics of States and Cities and that for the Division of Vital Statistics, were considered and, with only minor modifications, were approved.

ROBERT E. CHADDOCK, *Chairman* — J. FREDERIC DEWHURST
MURRAY R. BENEDICT — WILLIAM F. OGBURN
PAUL T. CHERINGTON — WILLARD L. THORP

Report of the Committee on Census Enumeration Areas

The Committee on Census Enumeration Areas has been able to interest people in 62 cities to the extent of preparing the necessary census tract maps and getting the approval of the Bureau of the Census.

Representatives of many of these census tract cities met in the Book-Cadillac Hotel in Detroit on December 29 for a consideration of the form of the tabulations for the 1940 Census which would be most valuable. The formation of definite recommendations was delayed until the meeting in December, 1939.

Since the Committee is not a census tract committee but rather a committee on census enumeration areas, consideration was given to the use of data by blocks as well as by census tracts. The cost of obtaining block tabulations, even though very simple and basic, and the cost of utilizing such detailed data was discussed at some length.

A recommendation was made relative to including block tables in the 1940 Census, and a great deal of interest was expressed in obtaining simple tabulations by blocks.

The Committee is faced with the problem during the next year and a half of creating suitable tabulation forms by census tracts to be used in the 1940 Census. The Committee will later be concerned primarily with the problem of getting the 1940 data by census tracts used extensively in all of the 62 communities to which it will be made available.

HOWARD WHIPPLE GREEN, *Chairman*
C. E. BATSCHELET
ROBERT E. CHADDOCK
NEVA R. DEARDORFF
ERNEST M. FISHER
CHARLES S. NEWCOMB
VERGIL D. REED
LEON E. TRUESDELL

Report of the Committee on Statistics of Delinquents and Criminals

The Committee on Statistics of Delinquents and Criminals has kept in constant touch with the work in criminal statistics done by the Bureau of the Census, and, in arranging for a conference (in connection with the annual meeting of the American Statistical Association) between state criminal statisticians and the users of criminal statistics, the Committee has attempted to promote a better understanding of the problems involved with the hope that such understanding may lead to the development of more systematic collection of criminal statistics as well as to their more intelligent utilization.

THORSTEN SELLIN, *Chairman*
RONALD H. BEATTIE, *Secretary*
C. E. GEHLKE
ROLF T. HARBO
GEORGE B. VOLD

Report of the Committee on Statistics of Institutions for Mental and Physical Disorders

Slated meetings of the Committee were held in May and November of 1938. Both of these meetings were devoted chiefly to the consideration of measures for the improvement of general hospital statistics.

The Committee has long felt that in the interest of national and state administration and planning for health, more complete and comparable statistics of hospitals throughout the country were vitally necessary. At present annual statistical summaries of hospital facilities and services are prepared by the American Medical Association, and, with a somewhat more limited view, by the American College of Surgeons and the American Hospital Association. Each of these national agencies naturally adapts its statistical procedures to its own special objectives. To date official annual compilations of hospital statistics have not been made for the country as a whole. Recently the United States Public Health Service, under the direction of its Surgeon General, Dr. Thomas Parran, has undertaken to compile and analyze available hospital statistics, however gathered, for the entire country, having

in mind the need of such data for public information and in anticipation of possible extensions of Federal support for hospitals in areas now suffering a lack of adequate hospital facilities. To these ends the Committee offered its cooperation to the Surgeon General in defining the problems of hospital reporting and in preparing the necessary schedules of statistical information. To facilitate such cooperative effort, the Surgeon General assigned Mr. Elliott H. Pennell of his statistical staff to meet with the Committee as necessary. This relationship has proved of great value to the Committee. It is expected that in the coming year a plan and procedure of hospital reporting will be prepared by the Committee and placed before the appropriate Federal agency for its advice and action.

Mr. Frederick W. Brown, a member of the Committee, has continued to maintain, in the Committee's behalf, cordial and constructive cooperative relations with the United States Bureau of the Census. All matters in the field of institutional statistics which affect the Census Bureau's practice and procedure in compiling statistics of institutions are brought promptly to the Committee's attention.

In this connection, the Committee wishes to report again its endorsement of the proposal of the Committee on Statistics of Delinquents and Criminals that a detailed census of institutions which would ordinarily be taken in 1943 be taken in 1940 at the time of the general census of population. The advantages of having data on institutions available earlier than 1943 and related to the population census of 1940 are so obvious in the Committee's view that it has undertaken to secure endorsements of this proposal by other national agencies concerned. The Board of Trustees of the American Hospital Association, on the suggestion of the Committee, has already taken formal action of endorsement of the proposal.

A conference called by the Association's Committee on Committee Organization and Activities early in 1938 evidenced that there is still apparently some misunderstanding among the committees respecting the precise nature and scope of their responsibilities. This is particularly evidenced among those committees working in the field of social statistics and varying views have been expressed respecting committee responsibilities, concerning particularly the interests of this Committee in general hospital statistics.

Regardless of the concern of other committees in social statistics generally, the Committee on Statistics of Institutions for Mental and Physical Disorders has interpreted its responsibilities exactly as these are indicated by its title. If, however, such interpretation and consequent work program conflicts with the views of other committees dealing with interrelated statistics, the Committee urges that further conferences of the general committee and standing committees concerned be held through the coming year to clarify the issues.

In the recent death of Kate H. Claghorn, one of its most respected and useful members, the Committee has suffered serious loss. As a former executive of the New York School of Social Work, Miss Claghorn brought to the Committee a wealth of experience and maturity of judgment in social sta-

tistics and their value which the Committee found invaluable. The Committee feels, therefore, that appropriate recognition should be given by the Association to Miss Claghorn's long and devoted service in its behalf.

The Committee wishes to express its appreciation of the assistance given it during the year by Dr. Robert Axel of the New York State Department of Social Welfare.

HORATIO M. POLLOCK, *Chairman*
CARL E. MCCOMBS, *Secretary*
FREDERICK W. BROWN
MARY AUGUSTA CLARK
EMIL FRANKEL
ELLIOTT H. PENNELL
DAVID M. SCHNEIDER
JOSEPH ZUBIN

Report of the Joint Committee on Relief Statistics

This Committee, representing both the American Statistical Association and the American Public Welfare Association, has continued this year its efforts to promote the improvement of relief statistics. Six meetings were held in the course of this year for committee consideration of problems and projects relating to its field and for hearing reports of sub-committees, through which much of its work this year has been accomplished. Five numbers of the Committee's informal *Bulletin of Information for Relief Statisticians* have been prepared and distributed during the year to a mailing list comprising about 500 agencies or persons. A series of Papers on Relief Statistics was inaugurated at the beginning of this year and the following six brief papers have so far been published:

Use by a State Agency of Social Data about Recipients of Public Assistance, by John M. McCaslin

Preparation of Valid Statistics of the Cost of Relief Administration, by Anne E. Geddes

Problems in the Compilation of Data on Total Relief and Work Program Expenditures, by Dorothy Fahs Beck

Households and Persons Receiving Relief or Assistance, by T. J. Woofter, Jr., and T. E. Whiting

Statistics in the Administration of a Public Welfare Program, by Ralph G. Hurlin

Studying the Effect of Unemployment Compensation on Relief, by Arthur Jacobs

Conference sessions for discussion of problems relating to relief statistics have been arranged for three occasions. In connection with the National Conference of Social Work at Seattle, June 26 to July 2, two such meetings were held under the auspices of the Committee. At the annual conference of the American Public Welfare Association for public welfare officials in Washington, D. C., December 9 to 11, a largely attended luncheon conference on relief statistics was held. On the program of the present annual meeting of this Association, the Committee is responsible for a session on the subject "Statistical Analysis of Public Welfare Problems."

At the request of the Social Security Board, the Committee has continued to act as the official advisory committee of its Division of Public Assistance Research. The Committee believes that substantial further improvement in national relief statistics has been made during this year, which is due chiefly to the progressive development of effective statistical organizations in the Federal and in many of the state agencies concerned with relief administration.

Current interests of the Committee may be indicated by the topics with which sub-committees are now actively concerned. They are: Conference programs; Standards for statistical positions in relief administration; Methods of relief case censuses; Collection of social data concerning relief recipients; Consolidated statistics for all relief programs; Statistics of cost of relief administration; Exchange of operating statistics of large city relief administrations; and Rural relief statistics.

RALPH G. HURLIN, *Chairman*
PAUL WEBBINK, *Secretary*
NEVA R. DEARDORFF
EMIL FRANKEL
ANNE E. GEDDES
HELEN R. JETER
JOHN M. MCCASLIN
HOWARD B. MYERS
ALLEN R. POTTER
EMERSON ROSS
SAYA S. SCHWARTZ
HERMAN M. SOMERS
FREDERICK F. STEPHAN

Report of the Committee on Labor Statistics

The Committee on Labor Statistics and the Advisory Committee on the Census held a joint meeting on January 8, 1938, in Washington, to discuss together some of the problems of labor statistics that are closely related to the population census. The discussion was concerned with the serious difficulties arising from conditions of widespread and prolonged unemployment in securing satisfactory statistics for the gainfully employed population. The greatly increased needs of government agencies for labor statistics were found to call for difficult classifications that previously were not very important. Considerable attention was given to the possibilities of relating statistics secured in the census of population to statistics resulting from the operations of the United States Employment Service and the Social Security program.

Carrying forward the recommendations of the occupational conference held by this Committee in 1937, the Committee continued to investigate, with the aid of the Secretary of the Association, the possibilities of increasing the degree of comparability between important occupational classifications now in use.

The Committee met in New York on June 25, 1938, for a full day session. The uses and problems of occupational statistics were considered at great length. It was decided to establish a sub-committee on occupational classifi-

cation to carry forward the work that the Committee had started in this field and to invite the cooperation of the Central Statistical Board in this program.

The current situation of employment, pay-roll and unemployment compensation contribution statistics was examined and a number of difficult problems were discussed. The Committee did not see its way clear to take definite action with respect to any of them at that time.

The relationships between employment office statistics and unemployment compensation benefit statistics were discussed. It was found that the situation was far from satisfactory and, although a number of organizations were giving some attention to the possibility of improving it, the Committee could perform valuable service in this field.

Following this meeting a Committee on Occupational Classification was established and the Central Statistical Board appointed a committee with identical membership. The members of this joint committee and the agencies that they represent are as follows: Howard B. Myers, Works Progress Administration, Chairman; P. K. Whelpton, Central Statistical Board; Leon E. Truesdell, Bureau of the Census; Aryness Joy, Bureau of Labor Statistics; Merrill G. Murray, Bureau of Old-Age Insurance, Social Security Board; W. H. Stead, U. S. Employment Service; Meredith B. Givens, New York State Division of Unemployment Insurance; and Gladys L. Palmer, American Statistical Association. This Committee met on July 18 and again on October 27. It established a technical sub-committee which has met very frequently and has had a staff at work conducting a number of research projects essential to the development of its work. The appointment of the Committee on Occupational Classification was reported to the members of the Association in the December *Bulletin*.

The Committee on Labor Statistics also requested Dr. Ralph G. Hurlin to make a study of employment and pay-roll statistics in relation to unemployment compensation contribution statistics. A preliminary report of his findings was submitted to the Central Statistical Board.

The Committee established a liaison with the Committee on Research and Statistics of the Inter-State Conference on Unemployment Compensation Administrators.

J. FREDERIC DEWHURST, *Chairman*

Report of the Joint Committee on Income Tax Statistics

At the annual meeting in December, 1937, the American Economic Association and the American Statistical Association continued the existing Joint Committee with the same membership as in 1937. The Presidents of these two Associations suggested that the American Institute of Accountants be invited to participate and Mr. Clem W. Collins, President of the Institute, appointed Mr. Henry B. Fernald, Mr. Norman L. McLaren, and Mr. Robert H. Montgomery as their representatives. It has been the intent

of the Chairman that the entire committee with its new members be brought together during the present calendar year with a view to its reorganization but no suitable opportunity for such a meeting has appeared and it is now intended that a general reorganization shall take place early in 1939.

Early in 1938 the United States Treasury asked the Chairman of the Joint Committee to serve as Chairman of an internal committee of the Treasury commissioned to go over at length certain proposed changes in the tabulations for *Statistics of Income*. As work upon this Treasury survey progressed the Chairman submitted to the members of the Joint Committee by mail certain suggestions which had been raised, asked for criticism of these suggestions and for other suggestions. The time schedule under which the Treasury survey was carried out rendered difficult arrangement for a general meeting of the Joint Committee to go over at a single session the long list of particular suggestions. The Chairman of the Joint Committee, therefore, sought to arrange for his own participation and the participation by correspondence of the other members of the Joint Committee in such a manner as to render the Joint Committee most effective as an aid. It is now anticipated that early in 1939 the Joint Committee can have a meeting at which a considerable list of suggested changes in tabulations, some of which have been proposed by the newly appointed members from the Institute, will be considered.

It is recommended that the two Associations and the Institute continue the Joint Committee during 1939.

W. L. CRUM, *Chairman*

Report on the Social Science Research Council, 1937–38

Of all the 7 learned societies which principally constitute, through their 21 representatives, the directorate of the Social Science Research Council, probably the American Statistical Association has as pervasive an interest as any, in the Council's activities as a whole.

During the year under review, the Council continued two broad lines of activity. One is distinguished by emphasis upon improvement of the social sciences as instrumentalities for attainment and diffusion of knowledge; the other by emphasis upon utilization of the instrumentalities for attack on current and continuing questions of public importance.

Improvement of the social sciences as instrumentalities involves attention to personnel and to methods and ways of working. *In relation to the development of research personnel*, the Council

Maintained seven pre-doctoral fellows in the first year of graduate study

Maintained seven pre-doctoral fellows in the second year of graduate study, all of whom had held Council fellowships during their first graduate year; made six appointments for 1938–39 of holders of first-year fellowships in 1937–38

Maintained nineteen fellows for pre-doctoral field training; made sixteen appointments for 1938–39; and secured provisions for awards in 1939–40

Maintained thirteen post-doctoral fellows; made four appointments for 1938–39; and secured provision for awards in 1939–40

Undertook compilation and issuance of a record of all holders of the various fellowships administered by the Council

Began an examination of the training of graduate students; and as a first step gathered from a number of institutions information as to requirements and procedures.

In relation to the improvement of methods and ways of working, the Council

Pursued its experiments in making knowledge more coherent by a process of analyzing some cluster of studies, assaying the knowledge already attained, and planning studies to fill in its gaps, to extend its bounds and further to test scientific generalizations. An undertaking of this type on *Culture Conflict and Crime* was published as a Council bulletin

Prepared a number of analyses of outstanding scientific works published in recent years in America with a view to determining current criteria of good workmanship

Initiated a series of conferences designed to permit examination of conference as a procedure in research

Began preparation of a memorandum on research in local history.

Studies of current and continuing questions of public importance were planned and in part conducted under Council auspices, principally in economic stability, in the social insurances, and in public administration.

Under a general plan of work in the field of economic stability involving studies of the extent and channels of investment, the rôle of credit, and the control of the operation, there were published by the National Bureau of Economic Research the first of two volumes on capital formation in the United States since 1921, and a pamphlet preliminary to further publications on real estate financing as one of the channels of investment.

Studies of the social insurances and relief were continued on an extensive scale. Work planned was in large part directly executed under the Council. A study of relief policies in a selected state and an analysis of labor statistics in terms of the social security laws have been published. Studies of European experience with old-age pensions and insurance, of British and German experience in coordinating the insurances and relief, on interrelations of unemployment insurance and unemployment relief were completed and are being prepared for publication. Various studies have been turned over to the Social Security Board and issued by it. Studies of federal relief policies, and of the collection of contributions and payment of benefits under the security laws were actively prosecuted.

Of the studies described in the two previous paragraphs, those which were published in 1938 and are predominantly statistical in character were chiefly Simon Kuznets' "Commodity Flow and Capital Formation" and W. S.

Woytinsky's "Labor in the United States: Basic Statistics for Social Security."

In public administration, studies were conducted on the administrative development of the Social Security Board, on the administration of the relief program of 1935, on the administration of the Tennessee Valley Authority, on the administration of British governmental grants-in-aid to localities, on the manager form of municipal government, on bureaus of governmental research, and on training for the public service. A two-year study was initiated of the administration of the Department of Agriculture which has developed interesting state and local relations. A large number of collaborative studies were made by individuals throughout the country in connection with the studies conducted directly under the Council on the manager form of government. Plans for studies on administrative problems of public tort liability were prepared and issued. Studies were published on administration of federal grants to the states, on administration of Canadian conditional grants, on Works Progress Administration in New York City, on administration of the N.R.A. Code in the men's clothing industry, and on the administration of unemployment compensation benefits in Wisconsin. Other studies have been issued by the Social Security Board. Studies were completed on public employment service and on administration of old-age assistance and prepared for publication.

Reports on research planning based on appraisals of the present state of knowledge were issued as Council bulletins on population re-distribution and migration differentials. There were issued also the last of twenty-one bulletins presenting plans for research in agricultural economics and rural sociology. A series of studies was completed on freedom of inquiry, speech, and publication.

WILLIAM A. BERRIDGE
STUART A. RICE
EDWIN B. WILSON

Report of the Representative on the Board of Directors of the National Bureau of Economic Research

During 1938 findings of the research staff of the National Bureau of Economic Research were made available in the following publications: *Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields and Stock Prices in the United States since 1856*, by Frederick R. Macaulay; *Commodity Flow and Capital Formation*, Vol. I, by Simon Kuznets; *Capital Consumption and Adjustment*, by Solomon Fabricant; Bulletin 69, *Statistical Indicators of Cyclical Revivals*, by W. C. Mitchell and A. F. Burns; Bulletin 70, *Employment Opportunities in Manufacturing Industries of the United States*, by F. C. Mills; and Bulletin 71, *Hours of Work in American Industry*, by Leo Wolman.

In addition, the *Report of the Committee on Prices in the Bituminous Coal Industry*, the first of the industry committee reports under the auspices of the Conference on Price Research, was issued. Volume II of *Studies in Income and Wealth*, prepared under the auspices of the Conference on Research in National Income and Wealth, went to press in December.

A study of changes in production and productivity was begun early in the year by Solomon Fabricant under the supervision of a committee composed of F. C. Mills, Chairman; A. F. Burns, N. I. Stone, and Leo Wolman. Publication is expected in 1939.

The program of research in finance, plans for which were announced in last year's report, was finally started in 1938. This program was inaugurated in response to recommendations of the Exploratory Committee on Research in Finance. The first project to be undertaken under this program is a study of consumer financing.

Upon recommendation of the Universities-National Bureau Committee, the Board of Directors at its annual meeting February 7, 1938, expanded the university representation in the membership of the National Bureau to two new institutions. On October 20 the Executive Committee elected Dr. Guy Stanton Ford, President of the University of Minnesota, and Dr. Frank P. Graham, President of the University of North Carolina, to serve as Directors by University Appointment.

On October 20, 1938, the Executive Committee of the National Bureau of Economic Research also elected the following members and alternates of the Committee on Cooperative Research: California, R. D. Calkins (alternate, Murray R. Benedict); Chicago, Jacob Viner (alternate, S. E. Leland); Columbia, J. C. Bonbright (alternate, Carter Goodrich); Harvard, John D. Black (alternate, Alvin H. Hansen); Michigan, I. L. Sharfman (alternate, W. A. Paton); Minnesota, R. A. Stevenson (alternate, Roy G. Blakey); North Carolina, Erich W. Zimmerman (alternate, Clarence Heer); Pennsylvania, Anne Bezanson (alternate, William J. Carson); Stanford, Joseph S. Davis (alternate, N. J. Silberling); Wisconsin, M. G. Glaeser (alternate, Harold M. Groves); and National Bureau of Economic Research, W. C. Mitchell (alternate, Simon Kuznets).

This Committee was organized upon recommendation of the Universities-National Bureau Committee, the members and alternates being nominated by their respective universities. The functions of this Committee are to supervise the cooperative research program of the universities and the National Bureau. At its first meeting, held at Hillside, November 26, 1938, the Committee reviewed the work undertaken thus far and considered developments for the future.

The National Bureau's annual report will be published following the annual meeting of the Board of Directors, February 13, 1939.

WINFIELD W. RIEFLER

Report of the Representatives on the Joint Committee for the Development of Statistical Applications in Engineering and Manufacturing

During the year the Joint Committee for the Development of Statistical Applications in Engineering and Manufacturing has continued to act as a clearing house for information for those interested both here and abroad in the applications of statistics to manufacturing problems. It has, as in previous years, helped to organize programs on industrial statistics and at least five of the nine members have during the year taken an active part in such programs. In addition to this work, the Committee has undertaken to define somewhat more carefully than has been done before the rôle of statistics in the production of goods to satisfy human wants. It has also started to compile an up-to-date list of the industrial firms where applications of statistics are being made.

WALTER A. SHEWHART
CHURCHILL EISENHART

Report of the Representative on the Sectional Committee on Standards for Graphic Presentation

The Sectional Committee on Standards for Graphic Presentation, Willard T. Chevalier, Chairman, which is sponsored by The American Society of Mechanical Engineers, has limited its activities during the past year to projects carried on by two of the subcommittees.

The Subcommittee on Engineering and Scientific Graphs has centered its efforts on the preparation of a manual on "Engineering and Scientific Graphs for Publication." Dr. Walter A. Shewhart is chairman of this subcommittee and has suggested four new projects, as follows:

1. Representation of functional and statistical relationships between more than two variables.
2. Construction of Nomograms and computation charts.
3. Graphical methods for effective communication of knowledge.
4. Graphical methods of indicating the limits of chance variation.

The Subcommittee on Preferred Practice in Graphic Presentation, A. H. Richardson, Chairman, completed during the year a 64-page booklet entitled "Time-Series Charts—A Manual of Design and Construction." This was approved and published by the American Standards Association in November, 1938, as an "American Standard." The manual represents a rather complete revision of the "Code of Preferred Practice—Time-Series Charts," published in 1936. Copies of the new manual may be obtained from The American Society of Mechanical Engineers, 29 West 39th St., New York, N. Y., at $1.25 a copy. By noting American Statistical Association affiliation and requesting a discount, members may secure copies at 10 per cent less than the list price.

A. H. RICHARDSON

List of Committees and Representatives for 1938

Committee on Fellows[1]

Emanuel A. Goldenweiser
E. Dana Durand
Walter A. Shewhart
F. Leslie Hayford
Frank A. Ross

Committee on Nominations

W. Randolph Burgess, *Chairman*
E. Dana Durand
Frederick C. Mills

Auditing Committee

Ernest M. Fisher
Donald S. Thompson

Committee on Investments[2]

Laurence H. Sloan, *Chairman*
Willford I. King
Dean Langmuir
Frederick R. Macaulay
Donald B. Woodward

Biometrics Section Committee

Lowell J. Reed, *Chairman*
Joseph Berkson, *Secretary*
Robert E. Chaddock
Selwyn D. Collins
John Collinson
Halbert L. Dunn, *ex officio*
J. V. DePorte
Alfred J. Lotka
Hugo Muench, Jr.
Richard E. Scammon
George W. Snedecor

Committee on Committee Organization and Activities

Meredith B. Givens, *Chairman*
Robert E. Chaddock
Morris A. Copeland
W. Leonard Crum
Neva R. Deardorff
J. Frederic Dewhurst
The President and Secretary, *ex officio*
Howard Whipple Green
Ralph G. Hurlin
Horatio M. Pollock
Thorsten Sellin
Willard L. Thorp

Advisory Committee on the Census

Robert E. Chaddock, *Chairman*
Murray R. Benedict
Paul T. Cherington
J. Frederic Dewhurst
William F. Ogburn
Willard L. Thorp

[1] With terms expiring at the end of 1938, 1939, 1940, 1941, and 1942, respectively.

[2] Appointed in accordance with By-Law 5 to supervise the investment of the Association's surplus funds.

Committee on Census Enumeration Areas

Howard Whipple Green, *Chairman*
Clarence E. Batschelet
Robert E. Chaddock
Neva R. Deardorff
Ernest M. Fisher
Charles S. Newcomb
Vergil D. Reed
Leon E. Truesdell

Committee on Statistics of Delinquents and Criminals

Thorsten Sellin, *Chairman*
Ronald H. Beattie, *Secretary*
C. E. Gehlke
Rolf T. Harbo
George B. Vold

Joint Committee on Income Tax Statistics (With the American Economic Association and American Institute of Accounting)

W. Leonard Crum, *Chairman*
J. Franklin Ebersole[3]
Ralph C. Epstein[3]
Henry B. Fernald[4]
David Friday
Robert M. Haig[3]
Simon Kuznets
Norman L. McLaren[4]
Robert H. Montgomery[4]

Joint Committee on Metropolitan Districts (With the American Marketing Association and the Chamber of Commerce of the United States)

Paul T. Cherington,[5] *Chairman*
T. W. Howard[6]
Ralph J. Watkins

Committee on Labor Statistics

J. Frederic Dewhurst, *Chairman*
Meredith B. Givens, *Vice-Chairman*
Ewan Clague
Margaret Elliott
O. A. Fried
Aryness Joy
Solomon Kuznets
Gladys L. Palmer
Eugene B. Patton
Paul L. Stanchfield
William H. Stead
Sidney W. Wilcox

Committee on Occupational Classification of the Committee on Labor Statistics[7]

Howard B. Myers, *Chairman* — Works Progress Administration
P. K. Whelpton, *Secretary* — Central Statistical Board
Meredith B. Givens — New York State Division of Unemployment Insurance
Aryness Joy — Bureau of Labor Statistics
Merrill G. Murray — Bureau of Old Age Insurance, Social Security Board

[3] Appointed by the American Economic Association.
[4] Appointed by the American Institute of Accounting.
[5] Appointed by the American Marketing Association.
[6] Appointed by the Chamber of Commerce of the United States.
[7] Originally appointed by the Committee on Labor Statistics and then established as a joint committee with the Central Statistical Board.

Gladys L. Palmer	American Statistical Association
William H. Stead	U. S. Employment Service
Leon E. Truesdell	Bureau of the Census

Committee on Statistics of Institutions for Mental and Physical Disorders

Horatio M. Pollock, *Chairman*	Emil Frankel
Carl E. McCombs, *Secretary*	Elliott H. Pennell
Frederick W. Brown	David M. Schneider
Mary Augusta Clark	Joseph Zubin

Joint Committee on Relief Statistics

Ralph G. Hurlin, *Chairman*	Howard B. Myers[8]
Paul Webbink, *Secretary*	Allen R. Potter[8]
Neva R. Deardorff	Emerson Ross
Emil Frankel[8]	Saya S. Schwartz
Anne E. Geddes	Herman M. Somers
Helen R. Jeter[8]	Frederick F. Stephan
John M. McCaslin[8]	

Committee on Statistics of Dependent Children in Foster Care

Neva R. Deardorff, *Chairman*	Robert J. Myers
Raymond F. Clapp	David M. Schneider
Emil Frankel	Emma A. Winslow
Morris J. Karpf	Helen L. Witmer
A. Wayne McMillen	

Committee on the Use of Statistics in Company Management

Theodore H. Brown, *Chairman*	F. Leslie Hayford
Donald R. Belcher	

Committee on Sociometrics

George A. Lundberg, *Chairman*	Samuel A. Stouffer
F. Stuart Chapin	Dorothy S. Thomas
Calvert L. Dedrick	George B. Vold
Stuart A. Rice	

Committee on Reviews in Mathematical Statistics

Paul R. Rider, *Chairman*	Walter A. Shewhart
Burton H. Camp	Samuel S. Wilks
Cecil C. Craig	

Representative on the Board of Directors of the National Bureau of Economic Research

Winfield W. Riefler

[8] Appointed by the American Public Welfare Association.

Members of the Social Science Research Council

William A. Berridge (For the term expiring December 31, 1938)
Stuart A. Rice (For the term expiring December 31, 1939)
Edwin B. Wilson (For the term expiring December 31, 1940)

Representative on the Council of the American Association for the Advancement of Science

Stuart A. Rice

Representative on the Business Research Council

Donald R. Belcher

Representative on the Board of Directors of the New York Management Council

C. M. Armstrong, Jr.

Representative on the National Conference on Nomenclature of Disease

George H. Van Buren

Representatives on the Joint Committee for the Development of Statistical Applications in Engineering and Manufacturing

Walter A. Shewhart Churchill Eisenhart

Representative on the Sectional Committee on Standards for Graphic Presentation

A. H. Richardson

Member of the American Documentation Institute

Frederick F. Stephan

BOOK REVIEWS

GLENN E. MCLAUGHLIN
Review Editor

Full Recovery or Stagnation? by Alvin H. Hansen. New York: W. W. Norton & Company, Inc. 1938. 350 pp. $3.50.

How close is the connection between abstract theorizing and policy determination in matters of the business cycle? How close is the coherence between successive stages of an economist's work done over a period of some five or six years? Both can be very close indeed, as is evidenced by Professor Hansen's new book. It consists, in the main, of 16 different articles and essays, which range "from theoretical analysis to a discussion of practical policy," published between 1933 and 1938 in various journals and reports; reviews of other theorists' works; discussions of current affairs; contributions to collective volumes; and papers read before learned societies. Yet, this book has not the appearance of a collection of articles. The whole work is perhaps as well-knit as any treatise on the problems of industrial fluctuations could be.

Part I, entitled "Investment, Saving and Monetary Control" contains Hansen's *J.P.E.* article on Keynes, his *Q.J.E.* article on Harrod, and the part of his *Econometrica* article relating to Hayek (with the part on Keynes' *Treatise* relegated to the appendix). These three articles are famous pieces in modern cycle literature, and every teacher of business cycle courses will welcome their collection in one volume. No substantial changes can be found in these chapters as compared with the original articles. The suppression of some "cracks" on Keynes which were contained in the earlier publications suggests that Hansen's position toward Keynes has become less critical. Indeed, the omission of a passage on "terminological difficulties" (especially in connection with the concept of the "propensity to consume"), together with some theses in later chapters, seems to indicate that Hansen has become a bit "Keynesianized." His failure to revise his Hayek critique may be interpreted in two ways: either he was not convinced by any of the points which Hayek offered in reply (*Econometrica*, 1934) or he did not have time for revisions.

A less-known pamphlet on Major Douglas and a 1936 article on "Recent Trends in Business-Cycle Literature" complete the discussion of modern writings. Before it became Chapter V of the book, the last-mentioned article was slightly rearranged and enlarged to include references to Lundberg's book (1937) and to Lange's *Economica* article (1938). In this chapter, which reviews, among others, Schumpeter's economic evolution theory, Hansen has occasion to expose the important role which, in his opinion, technical innovations have for our economic future: "Technical innovations, aided by bank credit expansion, alone appear capable of loosening up the joints and

releasing a fresh flow of invigorating blood throughout the economic organism" (page 114). And "Capitalism cannot live without ever expanding, without continued economic progress . . . . If we succeed in choking off economic progress, we may, indeed, eliminate industrial fluctuations, but we may also thereby destroy the system of free enterprise itself" (page 115).

Part II has the title "Consumer Purchasing Power and Social Security Reserves." The chapter on "The Flow of Purchasing Power" (contained in the Columbia University volume on *Economic Reconstruction*) and that on "The Investment of Unemployment Reserves" (partly contained in the Minnesota volume on Unemployment Insurance) are models of clarity and pedagogic exposition.

Part III deals with "The International Situation." The automatic gold standard is, for Hansen, part of a policy of "monetary pacifism," which is "perhaps as unrealistic in the current financial world as sentimental pacifism is in the current political world" (page 216). Hansen's realism does not, however, lead him into an apology for flexible exchange rates. "It should . . . be possible to achieve over prolonged periods substantial stability of exchange rates . . ." (pages 218–19). "The world has become too interdependent to achieve internal stability without securing first of all a workable external stability" (page 224). But can monetary stability exist under democratic institutions without more self-restraint than is exercised today by labor and other monopolistic groups? "Will the labor movement and the political instruments of social control be able to develop sufficient self-discipline to prevent periodic breakdowns in the money economy?" (page 219).

Part IV presents "The Economic Outlook." It offers a very able discussion of the 1937 recession. The recession is seen partially as a consequence of the four 1936 "accidents," "the European rearmament, the . . . drought, the veterans' bonus and the labor upheaval" (page 270), which led to an inflation of material and labor costs and to an accumulation of excess inventories. What part monetary policies—the raising of the reserve requirements and the gold sterilization—"played in puncturing the bubble is problematical" (page 270). Most serious, however, was the role of governmental expenditures. The gist of Hansen's thesis is that "a recovery resting almost exclusively on a rising tide of consumption can go forward only so long as the consumption stimulus is applied" (page 280). "A recovery reared on the stimulus to consumption . . . has no momentum of its own" (page 282). "Had governmental expenditures been combined with a planned program of cost reduction, there might have followed an expansion of income and employment not only via a stimulation of consumption, but also via a stimulation of new investment. This program we have not adequately achieved, and now that the consumption stimulus is withdrawn, the forbiddingly high level of costs renders it difficult for investment to hold back the receding tide" (page 288).

With all due skepticism as to the results of pump-priming policies,

Professor Hansen is by no means opposed to governmental loan expenditures. Quite on the contrary, he finds that, in our time of declining population growth (page 313), slow technological advance, and no territorial expansion, private investment outlets with attractive profit expectations are rare; in these times enlightened governments should become "intermediaries between the ultimate savers and investment outlets." Indeed, "the government is becoming an investment banker" (page 318). This, however, does not imply socialism. According to the concluding sentence of this stimulating and important book, "we may . . . learn that there is nothing incompatible between the survival of private capitalism and a generous admixture of public investment."

FRITZ MACHLUP

University of Buffalo

Essai sur la Conjoncture et la Prévision Économiques, by Alfred Sauvy. Paris Librairie Technique & Économique. 1938. 190 pp. 18 fr.

Mr. Sauvy's purpose in this work appears to be the encouragement among French businessmen, economists, and political leaders of a higher regard for the statistical study of economic trends. He feels that France lacks the trained personnel and the statistical services necessary in order that government may proceed intelligently in the ever-increasing economic rôle it is being called on to play. He has a fine understanding of both the possibilities and limitations of his subject.

In his "essay," he covers the entire subject of business-cycle research—its history, the principal agencies engaged in it both in France and elsewhere, the statistical materials available, the type of personnel and office equipment required, the statistical methods employed, the obstacles encountered, the results which can be expected, and their relation to the problems of present-day society. None of these questions is treated exhaustively or in detail, but they are all presented clearly and authoritatively.

United States economists who use French indexes will appreciate his evaluation of those indexes in Chapter IX. He believes that the French index of industrial production fluctuates too widely as between periods of prosperity and depression. For example, the index indicates a decline of 33 per cent from 1930 to 1935. Sauvy, weighting the various industries according to the number of persons employed and including rough estimates for other industries, arrives at a maximum of 20 per cent. His figure is doubtless representative of the drop in national production of all goods and services. For purposes of comparison with other countries, however, it is important to notice that just as France does, most countries have production indexes based on highly sensitive industries rather than on services, repairs, and other relatively stable components of total production.

In fact, many of the faults which the book finds with leading French indexes characterize similar indexes everywhere. Sauvy, however, is a perfectionist in these matters and wants statistical services improved to the

point where a fairly accurate picture can be constructed of economic activity at any particular time. He feels that such equipment is essential if an erstwhile economy of free enterprise is to make what he seems to consider the necessary transition to a more-or-less directed economy without losing most of the values which are its principal heritage from its past.

Robert B. Schwenger

Foreign Agricultural Service
U. S. Department of Agriculture

Capital Consumption and Adjustment, by Solomon Fabricant. New York: National Bureau of Economic Research. Publication Number 35. 1938. xx, 271 pp. $2.75.

This is an admirable piece of work—a credit to its author and to the broader project of which it is a part. For all its compactness of presentation, it gives every evidence of a determination to utilize every bit of material that can be shown to be of significance for the problem in hand; the data are treated critically and yet with imagination; and—most important of all—there is evidence throughout of an awareness of the theoretical issues which both illumine and are illumined by the data that Dr. Fabricant has so patiently assembled.

"Capital consumption," as the phase is used by certain business cycle theorists, is a much broader concept than the "capital consumption" which is discussed under that name in this book: for the phrase as used by most cycle theorists includes not only what Dr. Fabricant calls "capital consumption"—namely, "the current value of durable goods used up in production"—but also what he calls "capital adjustment," the two together making up what he calls "capital change." This fact, however, instead of constituting a basis for criticism of Dr. Fabricant's work, is to be regarded as one of its merits. For it should be clear, from a reading of this book, if it was not clear before, that the nature of the problems involved in both the measurement and the interpretation of the two types of "capital change" are so different in kind as to warrant the sort of separation which Dr. Fabricant proposes.

By far the greater portion of the present study is devoted to "capital consumption" in Dr. Fabricant's sense of the term. The reasons for this are several. In the first place, there is the good and sufficient reason to which the author repeatedly calls attention; namely, that it is "capital consumption," as he defines the term, which is more directly relevant to the determination of national income produced; and the present study is an outgrowth of the admirable work of Simon Kuznets on capital formation, which in turn was an outgrowth of Dr. Kuznets' own valiant labors toward the improvement of our national income estimates. In the second place, the data available for the measurement of "capital consumption," in the narrower sense of the term, are, for all their shortcomings, very much more extensive than the data required for an adequate study of "capital adjustment." And last—but

unfortunately not least—the inherent difficulties in the problem of measuring "capital adjustment" macroscopically are so great that everything would argue for a prior attack upon the problem of "capital consumption," in the narrower sense of the term, even if the data available for a study of "capital adjustment" were more extensive than they are.

These inherent difficulties are not slurred over in the two chapters (12 and 13) which Dr. Fabricant devotes to the problem of "capital adjustment." It should suffice to mention only two: (1) the vagaries of business practice with respect to the revaluation of assets, as affected by inertia, tax requirements, the desire to put a more or less favorable complexion on the state of a given enterprise, and the hundred and one other considerations that bulk larger in the interest of business men than a desire to know exactly what their property is "worth"; and (2) the fact that all valuation of assets represents a guess as to what is likely to happen in the future, for good and ill, and is, therefore, subject to revision as the future becomes the present, and the present becomes the past. To hope, in the face of these difficulties, and others upon which Dr. Fabricant touches, that, even with more adequate data than those which are assembled here, it will ever be possible to determine at the end of a given year how much capital, in the aggregate, has been "lost" or "destroyed"—to use a term dear to certain cycle theorists —in that year, seems to this reviewer simply impossible.

This is not to say, however, that nothing further can be done with the problem of "capital adjustment," except to accumulate more of the type of data which Dr. Fabricant himself has so patiently and ingeniously put together. A further lead is suggested by the author when he remarks (p. 228) that "to get at the true economic factors in each case of revaluation would require detailed studies of individual companies and individual industries." There is not the slightest doubt that certain types of "capital adjustment" are not only "real" (p. 231) but permanent. It is of considerable importance both for cycle theory and for social policy to obtain some quantitative notion as to the extent and the localization of such "real" and "permanent" instances of "capital adjustment" as there is reason to believe occur. It is no reflection on Dr. Fabricant's work to suggest that an attack on the problem by way of "detailed studies of individual companies and individual industries," with the possibilities offered by such studies for a closer evaluation of the validity of specific accounting practices and a closer appreciation of the rectifying judgment of history, will yield more in the way of an understanding of the scope and significance of "capital adjustment" than is yielded by even so intelligent an attempt as the one under review to deal with the problem in more macroscopic terms. On the contrary, the merits of the present volume are such as to encourage the hope that Dr. Fabricant himself may be induced some day to undertake exploratory studies in the direction indicated.

ARTHUR W. MARGET

University of Minnesota

Reinvestment Cycles and Their Manifestation in the Norwegian Shipping Industry, by Johan Einarsen. Oslo: University Institute of Economics. Publication No. 14. Chicago: Public Administration Service. 1938. 222 pp.

This study is an elaboration of the hypothesis—previously advanced by Marx, D. H. Robertson, Schønheyder, and others—that oscillations in reinvestment are a significant generator of business cycles. It also presents the results of an analysis of replacement (i.e., apparent reinvestment) in the Norwegian merchant marine during 1883–1932.

For purposes of the statistical investigation, the author considers a newly constructed ship to be a replacement when it is purchased in connection with the "shifting out" of an older ship, "even if the new construction is greater." He finds evidence of a five-years' cycle in replacement and new investment. The age distribution of "ships which have been sold and replaced by new constructions shows strong concentrations about the ages of 9 years and 19 years"; there is also a minor concentration about the age of 30 years. Apparently "84.6 per cent of the ships acquired as new constructions left the first owners before they reached the age of 30 years, but only 39.8 per cent of the ships were replaced. In other words, the total per cent of maintenance was 47.0." The author believes that his findings are a partial verification of the "reinvestment theory."

Briefly stated, the theoretical argument is that a mass of the capital goods in use at any time have come into being more or less simultaneously —and not necessarily as a result of business-cycle disturbances. A substantial part of such goods will be worn out or obsolete at about the same age, and, inasmuch as the period of amortization is fixed in accordance with this age, reinvestment in new capital goods will also be concentrated within a relatively short period. The force of these "pure (or generating) reinvestment cycles" would tend to be dissipated as a result of the dispersion of reinvestment over a somewhat longer period than original investment and also because of a falling off in replacements. However, the cycles are maintained by "secondary (or generated) reinvestment cycles" (which arise because reinvestment, after all, tends to be concentrated in periods of cyclical expansion) and by "shocks" (such as inventions and wars). Dr. Einarsen presents this theory as a logical explanation of the initiation of recovery and recession and of the "periodicity" of business cycles.

But, as the author points out, the conditions necessary for "reinvestment cycles" are essentially (1) a concentration within a relatively short time of primary investment in a significantly large quantity of capital goods; (2) a similar concentration of reinvestment around a typical replacement age; (3) a sufficiently high percentage of maintenance of capital goods by replacement. The author believes that these conditions are actually present: "There is no doubt that [original investment] shows a distinct tendency towards concentration in certain periods." "The available data . . . indicate that many various sorts of capital goods have a typical replacement age about 8–9 years." "In most . . . industries we may . . . expect that the maintenance per cent will be much greater than in the shipping industry . . ."

Obviously, further knowledge of the life characteristics of capital goods is required. Most difficult to determine, perhaps, is the extent to which reinvestment has "an *immanent* tendency to appear cyclically"—that is, the actual significance of reinvestment fluctuations as an originating force.

CARL T. SCHMIDT

Columbia University

The Theory of Prices, A Re-Examination of the Central Problems of Monetary Theory, Volume I, by Arthur W. Marget. New York: Prentice-Hall, Inc. 1938. xxv, 624 pp. Trade price $6.00, school price $4.50, plus postage.

Dr. Marget's penetrating approach to monetary theory takes the form of a vast book review on a comparative scale. Mr. Keynes is the subject or at least the occasion of almost every one of the 600 pages, beginning with the rather elaborate proof that Keynes has confused "quantity theory" and "quantity equations;" exactly 100 pages are devoted to this theme, essentially to show that those equations are neither "static" nor useless "identities" but "shorthand expressions to indicate the nature of the variables whose operation . . . influences prices" (p. 81). This discussion is followed by another 40 pages of extensive argument to prove that Keynes' own "dynamic" equations have been equally misunderstood by a number of Keynes' critics and that they are neither formally valid under all circumstances nor useful for "dynamic" analysis. Nor does the character of the book change in its second part ("Behind the 'Quantity Equations'") which consists largely of the systematic analysis of the position of Keynes and others to each individual element in the customary quantity equation: M and M', i.e., volume of money of ultimate redemption and volume of money substitutes (pp. 154–289); V, i.e., velocity of circulation and the cash balance approach (pp. 290–483); and T, i.e., the "volume of transactions" (pp. 484–600). The interest devoted to the fourth major element, namely to P, the general price level, is limited to such aspects as raised in Keynes' last book, e.g., the question of a Plurality of Price Levels. This again indicates what appears to be the main purpose of the entire study: to defend "the substance of received doctrine upon the subject of the Theory of Prices against the strictures of Mr. Keynes" and to demonstrate "the way in which the body of received theory has grown up."

The essential thesis of this defense, elaborated with painstaking documentation and sharp dialectics, is that "whole chapters in Mr. Keynes' *Treatise* were little more than a rewriting . . . of what is after all received doctrine" (p. 158); or that "certain of Mr. Keynes' utterances . . . are not to be interpreted as asserting a claim to priority . . ." (p. 171), etc. If, for example, Keynes charges the "traditional" doctrine with assuming a somewhat direct and rigid relationship between the market rate of interest on the one hand, and the volume of bank money and the price level on the other hand, Dr. Marget (Chaps. 7 and 8) proves with brilliant scholarship the lack of foundation for such charges. His searching analysis of the inter-

national literature reaches back to the early nineteenth century and offers substantial contributions to the history of monetary theories.

But the contribution goes beyond the elaborate demonstration of Mr. Keynes' amazing ignorance of monetary thought and of the not less amazing number of his inconsistencies. In spite of the controversial character of the book, Professor Marget helps to clarify some of the most important concepts of monetary theory. The critical discussion is followed not only by "restating the substance of received doctrine" but also by "evaluating this tradition" (p. 386). The reader will especially appreciate the masterly exposition (pp. 414–83) of the implications of the cash balance approach and of the inferences of the velocity concept applied to the circulation of goods (pp. 538 ff.); the analysis (pp. 538–47) of the insufficiency of the "output" concept as a substitute for "total transactions;" and the penetrating but not sufficiently conclusive criticism (pp. 302–413) of the "hybrid conception" of income velocity as a tool for the analysis of price-level changes.

The limitations of a review and the failure of the author to provide a summary forbid any attempt to indicate even in a general fashion the author's position and contribution to the numerous problems involved. His adherence to Wicksell may not be tasteful to everyone. For example, he insists somewhat dogmatically that interest as a cost and capitalization element cannot affect the general price level, *except* in so far as it affects the proportion between the flow of money and the flow of goods—apparently without noticing the question-begging character of this approach. The concept of a natural rate of interest is emphasized in the old sense of prospective profits, but the latter concept is used rather loosely. Dr. Marget's distinction between "relative" and "absolute" demand for cash balances (pp. 444 ff.) appears to the reviewer as a mere restatement of the well-known fact that the total volume of those balances does not depend on the volume of monetary outlay alone.

On the whole, the approach is critical and conceptual rather than "positive;" the author's interest is essentially "literary" and not "practical." Policy issues are carefully avoided; concepts are discussed with little reference to their "use" for other than purposes of logic; nor does the analysis reach the point at which factual verification could enter the scene. Even fundamental problems of monetary theory, such as that of money-creation in relation to production, are scarcely mentioned. This intellectual asceticism pervades the book with an air of theoretical remoteness and impartiality. May it be hoped that in a future volume of the work Dr. Marget will leave Mr. Keynes and other colleagues aside and will proceed to the "really" relevant problems in the same spirit of scholarship, unshakable logic, and intellectual honesty as displayed in the present volume which may be described as an historico-methodological introduction to clear the way, as no similar study has done before, for a forthcoming study of monetary policies.

Melchior Palyi

University of Chicago

The Evolution of Finance Capitalism, by George W. Edwards. New York and London: Longmans, Green and Company. 1938. xvi, 429 pp. $4.00.

In this book Dr. Edwards has undertaken the worthy task of filling a gap in financial literature, or, rather, in economic, financial, and social history. Undoubtedly, this vast field of the evolution of financial institutions has been neglected. Many writers have made contributions on special periods or institutions or even on the history of individuals, but no one has traced the complete story. To this task Dr. Edwards has made a contribution.

The first third of the book treats the rise of British capitalism. Consideration is also given to France, Germany, Italy, Japan, and Russia. The works of Marx, Engels, Hilferding, Lenin, Rosa Luxemburg, Kautsky, and Bukharin, as well as the works of classical writers, are drawn upon for explanatory and analytical conbributions. In the history of finance capitalism in the United States there is no clear demarcation of the rise and fall of the different eras and the dominating power of individuals, groups and institutions.

The community of interests that existed among many financial houses of the leading cities and how this community of interests was dominated by, or appeared to be under the leadership of, individuals or groups during certain eras is outlined by the author with an apparent admiration for the contributions of these organizations to the stability and industrial development of the times.

Rather thorough treatment is given the rise of Government debt and the tendency to substitute Government for private financing. The Government now dominates many of the leading financial institutions, such as the Federal Reserve System and the Federal Deposit Insurance Corporation.

Considerable space is devoted to the period of reconstruction since the crisis of 1929. While money rates are the lowest on record, the author says that standards of living of the people are being lowered "in order that a larger proportion of their annual return may be absorbed by governments and applied to unsound and destructive purposes." He points out that commercial banking channels are choked with excess funds and that, while funds are available for consumer financing on short term, there is insufficient investment capital to meet the needs of American industry. On page 337 the author states his views emphatically: "The reform of security capitalism is unquestionably the most pressing problem of the day. . . . If the forces of disintegration now in operation for a number of years continue unchecked in their ravages, then society will fall back to an economic status comparable only to the dark ages of a thousand years ago. On the other hand, intelligent leadership based on sound private management and efficient public supervision can lift security capitalism to a new economic renaissance, for a carefully directed security capitalism can well serve as a mechanism for a new industrial revolution which could give society an economic welfare not attained by any previous civilization."

The author will find many sympathizers with these views. It is his opinion that constructive leadership cannot be delayed if "financial capitalism" is

to provide for us the best that it has to offer. This ambitious undertaking on the part of Dr. Edwards deserves praise. Needless to say, much has been omitted, and it is possible that this undertaking will prove to be only an introduction to a new examination of our financial institutions.

Ivan Wright

University of Illinois

The Theory of Investment Value, by John Burr Williams. Cambridge, Massachusetts: Harvard University Press. 1938. xxiii, 613 pp. $5.00.

Mr. Williams attempts to stride two worlds—the abstract world of investment and interest theory and the real world of concrete security values. His book, he declares in the Preface, is addressed primarily to the intelligent investor and to the professional investment analyst, but he hopes that it will be of interest also to the economic theorist. The reverse is probably true. On the assumption that the investor is able to grasp Mr. Williams' "algebraic budgeting," there is only an elusive value to reward him for his efforts. The theorist on the other hand will find much of interest, particularly Mr. Williams' criticism of Keynes, his view of the future of interest rates, his quiet comment that "we must realize that the capitalism we have known may well prove to be only a passing phase in economic history," and his theory of investment value.

Investment value is defined by Mr. Williams as "the present worth of future dividends, or of future coupons and principal." He holds that "it is of practical importance to every investor because it is the critical value above which he cannot go in buying or holding, without added risk. If a man buys a security *below* its investment value he need never lose . . . but if he buys it above its investment value his only hope of avoiding a loss is to sell to someone else who must in turn take the loss in the form of insufficient income." Therefore, all we need to know to determine investment value are future dividends and principal. But if we knew these with any degree of certainty we should not need a theory of investment value. Mr. Williams anticipates such objections in a "Chapter for Skeptics," wherein he asks such questions as: "Are long range forecasts too uncertain?" "Is the theory too impractical?" "Is the theory corroborated by experience?" In answering he is forced back to a defense of pure theory in such statement as " . . . this book is not intended as a code of maxims for speculators, but as a treatise on economic theory for scientists . . . . The Theory of Investment Value shows how traders would act in the stock market if they were perfectly rational and farseeing . . . Gradually as men do become more intelligent and better informed, market prices should draw closer to the values given by our theory . . . since market price depends on popular opinion, and since the public is more emotional than logical, it is foolish to expect a relentless convergence of market price toward investment value." One may agree with

Mr. Williams that "investment analysis until now has been altogether unequal to the demands put upon it." Quantitative and qualitative tests and the establishment investment standards are earnestly to be desired, but a theory which depends in large measure upon long-range forecasts and which ignores "popular opinion" in the market does not appeal to either the intelligent investor or to the professional analyst. In the words of Marshall, "Thus it is not descriptive, nor does it deal constructively with real problems."

GEORGE W. EDWARDS

The College of the City of New York

Financial Organization and the Economic System, by Harold G. Moulton. New York and London. McGraw-Hill Book Company Inc. Business and Economic Publications, William Homer Spencer, Editor. 1938. xviii, 515 pp. $3.50.

This book is an outgrowth of the author's well-known 1921 publication *The Financial Organization of Society*. Among the new subjects in the present volume are: foreign financial systems and the forces involved in the fluctuation of prices.

The author has succeeded in presenting a comprehensive and interrelated picture of money, banking, and finance. While commercial banking receives more space than any other single financial process, extended discussion is devoted to topics which in most books of this kind are treated in summary fashion; e.g., investment houses, trust companies, stock exchanges, building and loan associations, etc.

Although a wide range of material is covered, occasionally an important phenomenon is presented in a rather superficial way. A case in point is the analysis of the expansion of bank deposits. The author assumes a situation in which there is only one bank in a given community, every customer of the bank uses a checking account as a means of payment, cash reserve is $100,000, and the reserve requirement is 10 per cent. "Under these circumstances it would be possible for the bank to make loans and create new deposit accounts not only up to the full amount of the $100,000, but even to ten times that amount" (p. 303). This statement is followed by an explanation consisting of three sentences which, though possibly adequate as a summary, fails entirely to show the mechanics or process by which the expansion of deposits to $1,000,000 is possible. Furthermore, the manner in which a tenfold expansion of bank deposits *for the banking system as a whole* can be achieved is not explained in any satisfactory fashion; a vague reference to "the collection and clearance system already described" dodges the heart of this confusing question. It still is necessary to *explain* that familiar analysis by which extra bank reserves may lead to a tenfold expansion of bank deposits, i.e., to show concretely how extra bank reserves are loaned by one bank, deposited in another, reloaned, etc. To assume that a reader

can grasp this process without step-by-step analysis is to assume that nothing needs to be explained and that a book on financial organization may properly consist of a series of undemonstrated propositions.

Dr. Moulton's treatment of the price problem is puzzling. There appears to be a confusion between the equation of exchange and the quantity theory of money: for example, it is pointed out that a weakness of the equation of exchange is that it "sheds no light upon the causal relationships among the various factors which make up the equation" (p. 499). Was the equation of exchange ever intended to shed light upon these causal relationships? A still "more fundamental weakness" of the equation "lies in the conceptions and assumptions inherent in the entire approach, and its complete failure to envisage the actual processes of price-making in a pecuniary system such as we have today" (p. 499). Precisely what does this statement mean? A "fundamental weakness" of the equation of exchange needs a fuller explanation.

The book is written not only for college and university students but for lay readers and businessmen as well. Unquestionably it will be of real service to both groups because of its wide range of materials, interesting discussions, and innumerable practical observations. Offsetting these commendable features is the author's rather frequent tendency to make statements without adequate explanation or to reach conclusions which, though possibly sound, do not follow from the data presented.

Harry Henig

University of Cincinnati

Trends in North Carolina Banking, 1927–1937, Prepared by the Research Committee of the North Carolina Bankers Association. Raleigh, North Carolina. 1938. 152 pp. 75 cents.

This study is further tangible evidence of the growing interest on the part of bankers associations, operating officials, and supervisory authorities in banking research of an institutional and regional nature. It is similar in scope to the earlier studies of the New York and Indiana Bankers Associations.[1] The primary purpose of the study is "to observe as objectively as possible the trends in North Carolina banking as it reflects the changing economic conditions in the country as a whole" (p. 12) and in North Carolina in particular. Changes in the banking structure and trends in the capital structure, deposits, reserves, loans, bonds, and earnings of the North Carolina banks since 1927 are analyzed by size groups.

Structural changes in the North Carolina banking system are indicated

[1] Cf. *Banking Developments in New York State 1925–1934*, New York State Bankers Association New York, N.Y., 1935; and the Report of the Research Committee, Indiana Bankers Association 1937, Part I, *A Study in Recent Banking Trends: A Statistical Analysis of Asset, Liability, Earning and Expense Data for Indiana Banks 1916–1936*, Indiana Bankers Association, Indianapolis, Ind., 1937.

by the decrease from 382 state banks and 77 national banks in 1927 to 160 state banks and 43 national banks at the close of 1937. The mortality rate in North Carolina was "considerably above the average for the country as a whole and for the South as a region" (p. 17). The most striking change in the size composition of the surviving banks has been the very great reduction in the number of banks with deposits of less than $250,000 and the substantial increase in the number of banks with deposits in excess of $1,000,000. The decline in the number of small banks has been due to consolidations, the authorization of "tellers' windows," and the consolidation of hitherto independent banks into branch systems. "These changes have unquestionably added an element of strength in North Carolina banking" (p. 20).

The functional aspects of the North Carolina banks, as represented by shifts in the assets, have undergone modifications similar to those experienced by banks in the country as a whole. The trend of primary reserves for North Carolina banks has been upward since 1927, and the ratios for the state are uniformly higher than the U. S. averages. In 1937, the primary reserves amounted to 32.6 per cent of the total assets in North Carolina banks. "Other loans" have declined from 42.9 per cent of the assets in 1928 to 18.1 per cent in 1937. "The most dramatic change in the assets of North Carolina banks relate to the trends in the quality and quantity of the bond account" (p. 79). Total investments increased from 10.1 per cent of total assets in 1927 to 33.5 per cent in 1937; United States obligations accounted for 20 per cent of the assets in 1937 and state and municipal bonds for 11.5 per cent. "It is probable that the bond account of North Carolina banks would be improved if a smaller proportion of the earning assets were in state and municipal obligations unless those investments are of such a high quality and so widely diversified as to leave no room for doubt as to their fundamental soundness" (p. 85).

There is an excellent final chapter which compares the pertinent ratios of failed banks with those of successful institutions. From this analysis, 14 specific factors which accounted for the bank failures in the State are enumerated. It is to be regretted that no liquidation results are included in the report, for state banking statistics on this important subject are notably lacking or inadequate.

Although this study is characterized by very careful statistical research, in the opinion of the reviewer it is too detailed and in some instances too minutely concerned with nonessentials to be inviting to most bankers. More aggregate data should have been given. Factual summaries at the end of each chapter and a final summary chapter unifying the main developments analyzed, together with more consideration of their implications, would have been valuable. Certainly a liberal use of charts and graphs would have enhanced the effectiveness of the presentation. Only one chart is to be found in the entire study. More careful consideration should have been given to the type of table used and to the possibility of combining many of the numerous tables. This is particularly true in the case of the tables on earn-

ings and expenses. Slight attention is given to branch banking developments in the state, and there are no separate data for state and national banks.

To teachers of money and banking, such studies afford a wealth of factual material to illustrate recent banking developments and practices, which material is lacking in most textbooks.

J. M. Whitsett

Ohio State University

The Commercial Paper House in the United States, by Albert O. Greef. Cambridge: Harvard University Press. Harvard Economic Studies, Volume LX. 1938. xxiii, 459 pp. $5.00.

The commercial paper market is the oldest and broadest part of the money market in the United States and is a direct outgrowth of the unit banking system. The development of the commercial paper market resulted in the more effective utilization of the country's banking resources than otherwise could have been achieved by the unit banking system. Mr. Greef's book is an excellent monograph on this phase of the money market. The book is very well conceived and carefully arranged.

Part I describes the development of the commercial paper market from the early days of the country to 1936. Interesting details on early development which are not generally known are found throughout this section. The peak of the commercial paper market was reached during the twenties, but since 1933 its importance has decreased materially. The author clearly explains the reasons for this decline. Thus, on page 145 he states, "This unprecedented decline in the volume of open market financing resulted mainly from forces which operated to restrict the supply of commercial paper, and only to a lesser extent from those which tended to limit the demand for such paper as an investment."

Part II deals with the organization and operation of a commercial paper house. The author has collected considerable new materials. His analysis on the organization and operation of dealers in commercial paper is not available elsewhere in concise form.

In Part III the author tries to find a place for the commercial paper house in the financial system of the country and tries to link it to the other short-term markets of the money market.

Although the author has discussed events up to 1936 only, the book is up to date, since no important new development has taken place. The volume is well documented and contains a very valuable bibliography. It adds to a better understanding of the operations of the money market and should prove of considerable value to all those interested in the field of banking and finance.

Marcus Nadler

New York University

Retail Sales Taxation, Relation to Business and Consumers, and Administrative Problems, by Neil H. Jacoby. Chicago: Commerce Clearing House, Inc. 1938. xi, 370 pp. $3.50.

This volume proves that experience in the public service is a fundamental element in the education of many social scientists. Professor Jacoby has not only discovered significant facts about retail sales taxes which would have been overlooked by an equally penetrating scholar without his background of administrative experience, but he has also devised methods of analysis which his academic colleagues would not have seen. Indeed, it is no exaggeration, despite the non-quantitative character of much of the subject matter, to say that Jacoby's ingenuity is not excelled in any American monograph on state taxation in the application of simple statistical techniques to the solution of technical economic and administrative problems. His use of qualitative methodology in marshaling economic, legal, and administrative data is also thoroughly workmanlike.

The study of general retail sales taxation in American states is divided into four parts: the first is historical; the second is analytical from the viewpoint of the consumer; the third is concerned with administration from the viewpoint of the retailer and the administrator; and the fourth is addressed to problems of public policy. There is a bibliography of both secondary materials and documents. There is, however, no table of cases; though many of the significant decisions of the courts have been cited. The index is adequate for reference purposes. The author treats the compensating use taxes developed to protect retailers subject to retail sales taxes as a phase of his problem.

The most significant conclusions from Jacoby's study confirm other work in the same field. Some findings especially significant—even though not in all cases new—are that sales taxes do not closely approximate the equivalent of a "spendings" tax; that evasion approximates 10 to 15 per cent of total levies; that there are 1 to 10 per cent of all sales which are protected by the commerce clause of the United States Constitution; that, taking an extreme illustration, the proportion of income required by a sales tax is sixteen to twenty times as great in the case of a family receiving a $1,000 income as in the case of one receiving a $1,000,000 income; that higher rates develop greater evasion than lower ones; that retail sales fluctuate more than national income and therefore constitute an unstable tax base; that food and automotive businesses are the greatest revenue producing schedules in state retail sales taxes; that total costs—to state, retailer, and consumer—of administering sales taxes aggregate between 5 and 10 per cent of gross revenue; that the incidence of the tax if the rate is 2 per cent or more is on the consumer; that the short-run incidence in all cases, however, is affected by legal provisions for shifting; that the (ordinarily concealed) effect of a sales tax is to reduce consumption of luxury items; and that there is financial and political reason for expecting that sales taxes will remain an important

part of state fiscal policy in about half of the states—at least for some time to come.

James W. Martin

University of Kentucky

Annotations on Small Loan Laws, Based on the Sixth Draft of the Uniform Small Loan Law, by F. B. Hubachek. New York: Russell Sage Foundation. Small Loan Series. 1938. lxv, 255 pp. $3.00.

This reference work fills a need. Several other scholarly studies have explored social and economic aspects of the small loans problem, and Camalier has compiled the statutes. Now, for the first time, we have a comprehensive guide to the application of the laws in judicial interpretation. The legislature defines, permits, commands, and prohibits; but only when the courts have had their say can we be sure how certain provisions apply in practice. Long an active attorney in the field and perennial chairman of the American Association of Personal Finance Companies' standing committee on law, Mr. Hubachek draws on a full stock of material. He cites some 450 cases, classified in a way to reveal the judgment of the courts on the important points at issue.

The scheme of classification is the sixth draft of the model Uniform Small Loan Law. Each of the 27 sections is compared with the provisions of earlier drafts, briefly commented upon, and then annotated point by point with abundant case references. When, for example, has a loan been invalidated due to failure of the lender to provide the borrower with the required statement of details? With a minimum of effort, the reader may put his finger on the decisions of the courts.

The appendix contains texts of the first, fourth, and sixth drafts of the Uniform Small Loan Law and complete citations of all state small loan laws in effect at the end of 1937, together with a summary which gives rates in force and shows, in rough outline, the relationship of the various state laws to the model drafts. As the author states, "the Uniform Small Loan Law does not exist as a statute." Therefore, for a full knowledge of the law of a given state, the student must study the local statutes and conditions, as well as the interpretive material in this work.

The book shows how far the courts have gone in stopping evasions of general usury laws and other legal interest limitations. Legally, "interest" is compensation which the lender actually receives for the use of money lent and does not include actual payments made to others on behalf of the borrower and from which the lender receives no benefit. A useful definition for the consumer, on the other hand, is the total cost of borrowing, including charges of every kind. (In line with this distinction, the forthcoming seventh draft of the Uniform Small Loan Law will change the word "interest" to "charges," in order to make the maximum legal percentage rates include all costs to the borrower.)

For state supervisors of small loans, prosecutors, attorneys, and legal aid societies, this work is indispensable. It is valuable, also, to students who wish to discover how effective regulation is developed, how loop-holes are closed up, and how workable regulatory laws for related fields may be shaped.

LEBARON R. FOSTER

Pollak Foundation for Economic Research

International Trade and Finance, by John Parke Young. New York: The Ronald Press Company. 1938. xviii, 526 pp. $4.00.

Elementary students will find this volume on international trade and finance to be a readable introduction to the considerable breadth of the field. More emphasis than customary has been placed on the descriptive approach to the subject, with about one-third of the text devoted to what may fairly be called historical examination. In addition, the monetary aspects of the economy, both national and international, come in for a large amount of extensive treatment.

The history, theory, and policy are comingled in such a manner that they form a mélange, the organization of which escapes the reviewer. Yet, for review purposes, it is most convenient to examine these three phases of the text separately.

Beginning with the Phoenicians and running the gamut of the Greeks, Romans, Italian cities, Portuguese, Hanseatic League, and the British, the historical development of international trading activities is sketched with considerable ability for descriptive summarization. The same is done for the United States from the colonial period to the present time. In addition to this history of international trade in the early portion of the text, most of the various phases of international affairs considered throughout the rest of the volume are introduced through the medium of historical facts. For instance, an examination of co-operative currency unions starting with 1865, history of foreign investments by Americans, history of tariff legislation from the Revolutionary War to the Reciprocal Trade Agreements Act, British tariff policy since 1914, reparations and war debts, course of international finance since the World War, silver in American history, progress in ship design since 1900, and the history of the American merchant marine are examples of the broad historical content upon which much of the book is based.

Turning to the theoretical aspects of the text, a chapter on the law of comparative advantage presents the thesis that countries produce and trade according to their comparative advantages in terms of money costs. Curiously enough, the brief reference here to the history of theoretical development credits Smith, Ricardo, and Mill as being responsible for the development of international trade theory without indicating clearly that their theories were based on real costs not money costs. Reference to Ohlin

or Haberler would not have been amiss in this connection. One might criticize the conclusion that, assuming going economies, comparative advantages translate themselves into absolute differences in money costs. Moreover, in Chapter 5 the author holds that when wages are low a country has low money costs, but then under the discussion of the "high wage argument" for tariffs (Chapter 20) he states, "American goods produced by high wages are sent to all parts of the world . . . This clearly indicates that American costs for these goods are lower." The elementary student might find these ideas confusing even though considered within the context.

In regard to the policy features of the text, treatment of American property rights abroad shows a curious combination of erudition and naivety. The latter is evidenced by such statements as "the Monroe Doctrine . . . is not a policy for seeking special privileges for American trade and investment, nor of superintending affairs of neighbors" and "it will not enforce this latter demand (nondiscrimination against its citizens abroad) by military means." Also, in dealing with restrictive trade practices other than tariffs, too little attention is given to the various administrative practices which act as trade barriers, i.e., sanitary regulations, classification for the customs, marks of origin, etc. Despite these weaknesses, there is considerable merit in the non-analytical and non-theoretical portions.

For the elementary student, who wishes to obtain a historical, factual basis for more advanced study in the realm of international trade and finance, Professor Young's *International Trade and Finance* can be recommended.

Edward C. Welsh

Ohio State University

America's Stake in International Investments, by Cleona Lewis, Assisted by Karl T. Schlotterbeck. Washington, D. C.: The Institute of Economics of The Brookings Institution. Publication No. 75. 1938. xvi, 710 pp. $4.00.

This book is a further contribution of The Brookings Institution to the study of international financial relationships. It is a painstaking and comprehensive study, embracing much of the same field as covered in earlier studies of The Brookings Institution, but presenting a longitudinal view of the evolution of the United States from a weak debtor country during the early days of our national life to the strong financial position of today. It is not merely a description of the investments of the United States in other countries but also an analysis of investments by other nations in this country.

Part I is a detailed description of the forces leading to investment by foreigners in the United States, including railroad expansion, the sale of local, state, and national Government bonds abroad, and the investment of foreign funds in American industry. There is an interesting description of the transition of our position from debtor to creditor nation during the

period of the World War, followed by a description of the shift in investments by other countries in the United States in the postwar period.

Part II is a description of the investments of the United States in other countries. It contains much material hitherto available only in a great variety of sources on the reasons for investment by American citizens abroad, such as trade, banking, mining of gold, silver, and copper, drilling for oil, the exploitation of many other mineral and agricultural resources, the development of branch factories and public utilities, as well as the sizable government loans made during the period of the World War. The conclusion is reached that private investments in the form of American-controlled enterprises operating abroad have been, in general, very profitable, but that private investments in foreign securities and loans by the United States Government to other governments have not shown such a favorable return. The development of these international financial relationships is presented realistically against a background of the economic processes out of which they emerged.

Part III is a description of the evolution of the debtor-creditor position of the United States, supplemented by a brief description of the shift from a debtor to a creditor position on the part of several other countries, namely, Holland, Great Britain, France, and Germany.

While the book as a whole is descriptive, certain theoretical issues of significance to the future are raised in the last chapter. The brevity of these theoretical considerations is explained in the preface to the book, which promises a program of further studies during the next few years in which several of the issues set forth in the concluding chapter will be explored. Yet, as it stands, the volume is a definite contribution of a realistic character to the literature of international finance.

JAMES F. CUSICK

Dartmouth College

France Overseas, A Study of Modern Imperialism, by Herbert Ingram Priestly. New York and London: D. Appleton-Century Company, Inc. 1938. ix, 463 pp. 10 maps. $5.00.

This substantial study is the first one-volume presentation in English of the ups and downs of France's colonial ventures from the beginning to recent date. Presented very much as Frenchmen have recorded it, the book also reflects the author's apparently greater familiarity with the administrative side of the story, with emphasis on experiments in military control, land policy, the native problem, and the like, with a minimum of diplomatic history.

The treatment of taxation, budgetary problems, and commercial policy is descriptive rather than analytical, and leaves much unsaid, particularly as regards tariff policy. In his concluding chapter on "Recent Trends" the

author gives very little idea of what the trend toward imperial self-sufficiency has meant economically. For example, he cites as an isolated fact (page 403) that in 1927–28 France's colonial trade was around 12 to 15 per cent of her total foreign trade, without pointing out that about the same proportion prevailed before the War, or that by 1935 it had practically doubled, thanks to increased trade restrictions imposed by France and her chief customers, which caused France's trade with foreign countries to decline but which did not apply to her colonies.

Despite the blurb on the jacket that the book shows the economic motive to be predominant in French colonialism, there is little evidence that this is so and practically no statements to that effect by the author. Indeed his constant reference to such intangibles as pride, prestige, nationalism, and even to the "highly religious nature of international rivalry," indicates that these are to his mind the most potent influences. He avers that "colonialism is an inveterate habit of the Western peoples, which involves pride of possession and activity, a yearning for prestige, regardless of success or profit" (pages 396-97). We also read that, as regards France, "the determination was to hang on to imperialism in spite of the cost . . . " (page 400). Not until the World War proved its value did the French colonial movement cease to be unpopular. After a century of indecision, France at last made up its mind to have a planned empire at all costs and began to consolidate her colonial position, institute reforms, and push the program of imperial self-sufficiency to the limit.

Notably and refreshingly lacking are the usual generalizations about "economic imperialism" and the supposed necessity of capitalistic countries to expand into backward areas. The author dresses up his book with a few trade and population statistics, but he makes no effort to present a "balance sheet of imperialism." He concludes that "the possession of colonies is a political liability rather than an asset;" and he apparently agrees with Southworth (who, incidentally, is an American, not an "English economist"), whose *French Colonial Venture* undertook to show statistically that French colonialism does not pay. However, "there is no gainsaying that colonial enterprises have often yielded rich returns to private initiative, usually at the expense of the home population as well as of the native one" (page 397).

The author thinks that "tremendous benefits are likely to accrue" from a study of the economic problems of imperialism by "impartial economists" (page 426). The reviewer is considerably less sanguine, not because balance sheets and inductive studies would not verify an economist's worst suspicions, but because such studies are likely to yield no tremendous benefits. Planned empires, like any other type of planned economy, do not operate noticeably on the basis of economic calculation and are not likely to be moved by the findings of economic calculators.

E. M. Winslow

United States Tariff Commission

Statistical Tables for Biological, Agricultural and Medical Research, by R. A. Fisher and F. Yates. London: Oliver & Boyd Ltd. 1938. viii, 90 pp. 12/6.

The reader who anticipates the usual collection of statistical tables will be pleasantly surprised by this volume. Strictly functional in design, it is streamlined for the investigator who uses statistics as a tool in his researches. A considerable amount of hitherto unpublished material is included. One striking feature is the attention devoted to the examination and application of the Latin square.

As would be expected, most of the tables based on the normal distribution are presented in Professor Fisher's characteristic style, the argument being the probability of the function tabulated. The probability 0.001 together with a line for 120 degrees of freedom have been added to the table of t. The 0.1 per cent points have been added to χ^2 also. The tables of z, in addition to carrying the line for 120 degrees of freedom, have been augumented by the 20 per cent points worked out by H. W. Norton. The points now tabulated enable one to combine the probabilities from several tests of significance by use of twice the negative natural logarithms. Those who object to entering the auxiliary table of natural logarithms for the z-test of significance will be pleased to find complete duplicating tables of e^{2z}, designated as "variance ratio"—the function first tabled by Mahalanobis in 1932 and called "F" by the reviewer in honor of Professor Fisher in 1934.

Transformations are discussed concisely in the introduction, followed by tables of probits and the useful angular transformation, $p = \sin^2\phi$. Toxicologists will welcome an adequate account of C. I. Bliss' calculation of the dosage-mortality regression, including both formulas and a worked out example.

Complete enumerations of the Latin squares 6×6 and smaller are specified. In addition, some newly acquired facts about the enumeration of the 7×7 squares are reported with four examples. There are sets of orthogonal Latin squares of sizes 9×9 and less. "Besides their use in ordinary factorial design, complete sets of orthogonal squares serve as the basis of quasi-factorial and quasi-Latin square designs (balanced lattices and lattice squares) and also serve to generate other designs in balanced incomplete blocks." A generous discussion of balanced incomplete blocks includes a numerical example and convenient indices of known designs.

Moving counter to the custom of employing rectangularly distributed data, such as ranks, for calculating regression and analysis of variance, the authors present tables of normally distributed scores for such ordinal data. These scores, resulting from the transformation of the ranks to normal deviates, are suitable for analysis of variance, correlation, and other statistical methods founded on the normal distribution.

The heavy calculations associated with orthogonal polynomials are greatly alleviated, under specified conditions, by tables of ξ' from ξ'_1 to ξ'_5 (Fisher's notation) for-values of n' from 3 to 52. A numerical example serves to illus-

trate the computations. This timely contribution is especially welcome to the group engaged at present in developing the attractive possibilities of these functions.

The novel features of this volume of statistical tables include a new list of random numbers conveniently arranged for the purposes to which such numbers are usually put. The list contains 30,000 digits.

More conventional are the offerings of tables of logarithms with bases 10 and e (the latter somewhat more than usually extensive); of squares, square roots and reciprocals; of factorials, and of natural sines and tangents.

The pleasing typography of the tables promotes accuracy in use. Five minor corrections should be noted by those having the book:

Page 8, line 6. The quantities specified as "range" are really range/4.

Page 14, line 4. The exponent of p is $n-r$.

Page 15, line 10. $A=\bar{y}$, not $\bar{x}$.

Page 20, 6th line from bottom. The reference numbers are Jordan (20) and Aitken (18), (19).

Page 48, line 1 of solution 16. The letter e in block 2 is blurred. The block letters are *adefj*.

The Fisher and Yates tables constitute a valuable tool in the kit of the practicing statistician, especially of him whose concern is in the design of sampling procedures and the reduction of their results.

George W. Snedecor

Iowa State College

A Method of Isolating Sinusoidal Components in Economic Time Series, by O. W. Blackett and W. P. Wilson. Ann Arbor: University of Michigan, Bureau of Business Research. Michigan Business Studies, Volume VIII, Number 4. 1938. 58 pp. $1.00.

It is well known that the problem of the choice of methodology in the analysis of business cycles is far from solved. This is true despite the rather widespread current use of methods which break down the series used into four components: trend, seasonal, cyclical, and random. Customarily the cyclical component in this type of analysis is viewed as a residual, and the random components as a large number of unrelated, nonrepetitive factors governed largely by pure chance. The authors of this interesting pamphlet suggest that this analysis does not bring to a conclusion the analysis of the cyclical movement but merely indicates the need for going further. A time series is defined as having a "tendency toward periodicity" which is distorted by erratic forces, that is, there are one or more components, each periodic in its tendency to fluctuate. The result of having these several components act together is to give a curve which does not seem to be at all periodic. Periodicity is further obscured by random forces, which act to produce cyclical variation, but at the same time also tend to shift the phases of the cycle, thus obscuring its periodic character. The whole series, further, can

be resolved into its components for brief intervals. The authors make it clear that they do not contend that this is the way in which cycles are built up but present it as a working basis for their method which has some logic to support it.

This is, of course, the crucial point in any attempt to analyze time series statistically. The single correct method of analyzing time series will be derived only after the true nature of the causative forces has been established on a logical basis. The use of the sine curve in time series is not new. Admittedly used as a probing tool, there does not seem to be any reason to assume that analysis by means of a sine equation will not result in some interesting additions to present speculation on the nature of the business cycle. It must be remembered, however, that too great a departure from reality in the analysis of time series will lead almost inevitably to errors and misinterpretations. The application of the suggested type of analysis cannot have any greater validity than the other methods used until the basic economic assumptions can be substantiated.

The method used follows from the assumptions on the nature of time series and certain properties of the sine curve. The first step is to bracket the data by adding alternately spaced values in the series, that is, the bracket for a given month is the sum of the values for the months immediately preceding and following in the sequence chosen. The length of the interval between brackets is determined by the length of the period studied. This interval is in terms of variously spaced units of time. A second set of brackets can be secured by repeating this process on the first set, and similarly for any number of brackets. If sinusoidal components are present they will be reflected in these brackets. The authors next develop a generalized form based on least squares for fitting to a series where the functional expression is $U = A \sin(at + b)$ or $U = A_1 \sin(a_1 t + b_1) + A_2 \sin(a_2 t + b_2)$ for two components, and so on for as many components as may be present in the original series. Fitting this function to the brackets gives a constant which is a measure of the form of the curve of the component which is being studied and also a different constant for each separate component. The authors also show that each component can be reconstructed separately.

As far as the method itself is concerned, a number of questions remain to be answered. Most of these are recognized by the authors themselves, and in some instances they have reserved judgment until further study has been made. Perhaps the most important question to be answered exactly is that concerning the number of components present in the series. Another is that of choosing the proper bracket intervals. Some general solutions of these two problems are suggested by the authors. They also assume that the various components can be fitted by additive sine functions. This last problem, as well as other similar ones, however, leads back to the basic problem of how well the method suggested approaches reality.

MORTON S. NAGELBERG

Columbia University

Elementary Mathematical Statistics, by William Dowell Baten. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Ltd. 1938. x, 338 pp. $3.00.

"This book was written primarily for students interested in statistics who have not studied differential and integral calculus. It attempts to develop formulas and fundamental relations by the use of very simple algebra, trigonometry, and analytical geometry." In keeping with the author's expressed intention there is no advanced mathematical theory in this volume, though many formulas here derived from first principles usually are stated merely in completed form in nonmathematical texts on elementary statistical methods. The basis is therefore provided upon which a well-rounded course may be built, if the instructor is prepared to supply much of his own problem and explanatory material. It has occurred to this reader that a very modest use of the calculus would have simplified the author's exposition at many points while not greatly reducing the audience to which a book of this kind has appeal.

In the first chapter the student is introduced to an essential group of mathematical symbols and to a somewhat inadequate treatment of graphic presentation. Use of the traditional symbols is adhered to for the most part but at times throughout the book seldom-used symbols are injected compelling the reader to do considerable backtracking into earlier chapters. A more complete system of cross-referencing would have been desirable and also more references to advanced work when the derivation of a particular formula was beyond the scope of this text.

A chapter on permutations and combinations and elementary probability ties in well with the subsequent treatment of the Bernoulli distribution and chapters on sampling theory and the analysis of variance. The presentation of the problem of sampling from an unknown parent is introduced by the consideration of groups selected from known parents. This exposition strikes the reviewer as the most useful in the book. The method employed of computing the theoretical frequencies of a distribution that may be assumed normal is rather cumbersome, and, although the steps are worked out logically enough, a somewhat simpler method of exposition is available elsewhere. Useful formulas are provided for the standard deviation of the sum and the difference of different series of variates. Systematically derived measures of skewness and kurtosis are given in the form of functions of the third and fourth moments about the mean and the corresponding power of the standard deviation. Simple, multiple, and partial coefficients of correlation are developed from the normal equations, and the general case of s independent variables is considered with the necessary determinants being set up for the solution of the constants involved. This reader would have appreciated a fuller treatment of rank and tetrachoric correlation and analysis of variance even at the expense of a somewhat longer text.

Since the book is not specifically designed for the economic statistician the treatment of index numbers and time series analysis is not elaborated

and in fact scarcely provides the bare essentials for the student of those subjects. This text together with the useful tables which are appended should make a contribution to the satisfactory teaching of this rapidly developing subject.

JOHN O. MCDIARMID

Carnegie Institute of Technology

The Cost Principle in Minimum Price Regulation, by Herbert F. Taggart. Ann Arbor: Bureau of Business Research, University of Michigan. Michigan Business Studies, Volume VIII, Number 3. 1938. iv, 332 pp. $1.00.

This treatise complements in part Professor Taggart's *Minimum Prices under the N.R.A.* published in 1936. It attacks primarily the feasibility, rather than the desirability, of current attempts at minimum price regulation. It is a thorough, able, and vigorous argument for the principle "that any comprehensive effort to establish uniform methods of costing for purposes of forbidding sales below cost is bound to be a failure." His conclusion is based on numerous theoretical, as well as practical, considerations, although the sole purpose of the treatise is to indicate in detail the technical difficulties of cost accounting as one of the primary arguments against an effort to forbid sales below cost—an effort partially in conflict with the presumably desirable theory of free competition.

"Cost accounting does not consist of a set of fixed rules universally recognized and universally applicable." Cost "definitions" or "formulas" or "systems" must fail because of vexatious problems of applicability, not only in simple industries but particularly in those more complex industries where members encroach on the field of others. The three elements of cost—materials, labor, and overhead—are respectively considered in relation to cost formulas. The problem presented by production at various degrees of normal capacity is considered.

HOWELL A. INGHRAM

Columbia University

Service Charges in Gas and Electric Rates, by Hubert Frank Havlik. New York: Columbia University Press. London: P. S. King & Son, Ltd. Studies in History, Economics and Public Law, Edited by the Faculty of Political Science of Columbia University. Number 435. 1938. 234 pp. $2.75.

The term "service charge" is defined by Dr. Havlik as "a genus of fixed charges, whose several species are basically intended to recover all or some part of customer costs." The use of such charges in schedules of gas and electric rates has been both strongly advocated and opposed. Dr. Havlik carefully reviews and expands the arguments, with a conclusion in favor of the adoption of service charges in most situations.

In answer to the questions of what specific items of cost a gas or electric company should endeavor to cover in its service charge, how these costs may be calculated or determined, and in what manner the charge should be incorporated in the rate schedule, Dr. Havlik frankly admits that "the questions proved so complex, and the attempt to answer them raised so many new problems" that the conclusions reached "must be largely tentative." It is suggested that in some cases no service charge is necessary, in others a small charge would be desirable, in still others a large amount might be collected, and finally it might be used as a temporary expedient. Moreover, "there is ground to believe that the fixed charge should be either very high, so as to permit promotional follow-on rates to be offered, or so low that the customers will not object too much."

While Dr. Havlik has left unanswered a number of questions which are connected with the use of service charges, his study is a useful summary of existing arguments and renders a service in pointing out the present confusion in the meaning of the term, the conflicting theories regarding its determination, the lack of adequate cost studies on which to base the charge, the negligible amount of information regarding the results of adopting service charges, and, in general, the "paucity of reliable data on many aspects of the subject." A fruitful field for further investigation has been indicated.

Claude E. Puffer

University of Buffalo

An Experiment in the Registration of Vital Statistics in China, by C. M. Chiao, Warren S. Thompson, and D. T. Chen. Oxford, Ohio: Scripps Foundation for Research in Population Problems. 1938. 115 pp. $1.00.

This is a detailed study of Hsiao Chi, a rural area consisting of 221 villages and lying in the lower Yangtze delta, midway between Shanghai and Nanking. In 1932 this "fairly typical" area contained 21,864 persons, 1,573 per square mile and 2,673 per square mile of cultivated land, or one person per quarter-acre of cultivated land. The population had a very low standard of living and was shot through with ignorance, superstition, prejudice, and fear of the government.

This careful and closely supervised record of natality, mortality, nuptiality, and migration in 1931–35 reveals not only the almost insuperable obstacles to demographic registration in China, but a picture of an area, representative of China, where the misery-ridden masses "breed like rabbits," and where, in consequence, life is cheap, nasty, brutish, and short. Birth, death, and fertility rates are higher than for other countries for which records exist. The crude birth rate in Hsiao Chi, 45.1, high because of both the favorable marital composition of the population and the high level of marital fertility (265 births per 1,000 married women, aged 15–44), exceeded the crude death rate, 38.5 in 1931–35 (but 52.0 in 1933–34), by only 6.4

per 1,000, an excess that but awaited a bad crop or health year to be wiped out. High specific and infant (241 per 1,000) mortality served to counterbalance the not very operative preventive checks (i.e., voluntary and involuntary abortion, infanticide, and partial prohibition of the remarriage of widows). Net annual emigration remained too low to provide relief from the continual pressure of numbers to grow.

Differential natality and mortality in Hsiao Chi differ somewhat from that observed in the United States. Natality in the rich, the well-to-do, and the poor classes, respectively, was 36.5, 48.7, and 44.2, the differences being attributable chiefly to differences in marital composition, working conditions, and the incidence of migration. Corresponding mortality rates were 28.5, 35.7, 41.8, the differences reflecting differences in economic pressure. Comparative neglect of the young females has served to reduce their relative number.

In an appendix on the probable effects of progress in agriculture and industrialization in China, Dr. Thompson paints a gloomy picture. The inability of the Chinese to find a sufficient foreign market for their products or to develop an internal market, together with their lack of resources, leads him to anticipate little improvement from industrial expansion. He is much more optimistic than Dr. Chiao relative to the augmentability of both the cultivatable area of China and the yield per acre, suggesting that Chinese agricultural production can be doubled; but he indicates that, given the present lack of education and the "grip of the family system," even if agricultural production were to double, 80–85 per cent "of such increase will go to the support of *more* people," and but 15–20 per cent "to the improvement of standards of living, chiefly in the more favored economic classes." Effective and widely-diffused birth control constitutes the sole source of relief.

J. J. SPENGLER

Duke University

Die Berechnungen über die künftige deutsche Bevölkerungsentwicklung, by P. J. Deneffe. Leipzig, Germany: Hans Buske. Frankfurter Wirtschaftswissenschaftliche Studien. Herausgegeben von Prof. Dr. W. Gerloff. Heft 3. 1938. 175 pp. RM. 5.25.

This treatise is a distinct contribution to the problem of population prediction. It does not treat in great detail any of the specific methods used in such prediction, nor does it present any detailed calculations, although it gives many of the predictions made concerning the future size and composition of the German population. The author distinguishes carefully between two general classes of methods, those concerned with the prediction of the actual future population, and those concerned with the establishing of a future population as indicative of the "development tendencies" of an existing one.

The book is divided into three parts. The first deals with the aims, methods, and results of determining the actual future population. The aims are embodied in an "Idealprogramm" which includes all practical and scientific considerations concerning the future population. This must be limited in practice to a "Realprogramm" concerned only with some of the simpler properties of the future population, as age and sex distribution. The author emphasizes the importance of distinguishing between estimates which shall be regarded as approximations and those to be regarded as maximum or minimum values. Two general methods of attaining the desired aims are discussed. The first method is that of extrapolation by employing equations of population growth. This method is criticized because of the lack of uniqueness of the equations and because the only practical result is an estimate of the total size of the population. Considerable attention is devoted to the second method, called the "Biological Method" or "Die Methode der jahrgangsweisen Fortschreibung," consisting essentially of taking an initial population, which may be distributed according to one or more characteristics, such as age and sex, and carrying it forward year by year by applying to it appropriate future rates of the various phenomena, such as births and deaths. Since the behavior of these rates is unpredictable, one must resort to assumptions, the nature of which will depend on past behavior as well as on the accuracy desired for the estimates. The rates of which knowledge will be required include age and sex specific death rates, age specific fertility rates. This "Biological Method" appears to have been used extensively in estimating the future population of Germany. Many of these estimates are discussed, especially with regard to the assumptions made.

The second part deals with the methods designed to measure the "development tendencies" existing in a population. The concepts of "stationary" and "stable" population are introduced.

The third part discusses the conclusiveness of the results attainable by the above methods.

John W. Fertig

The Johns Hopkins University

Needed Population Research, by P. K. Whelpton. New York: Milbank Memorial Fund. 1938. xvi, 196 pp. $1.00.

Research Memorandum on Population Redistribution within the United States, by Rupert B. Vance. New York: Social Science Research Council. Bulletin 42. 1938. xi, 134 pp. $1.00.

Research Memorandum on Migration Differentials, by Dorothy Swaine Thomas. New York: Social Science Research Council. Bulletin 43. 1938. xii, 423 pp. $2.00.

Fortunately for population there is a considerable wealth of quantitative

data amenable to statistical methods of analysis. Consequently, population research has achieved a higher level of scientific merit than research into many other phases of human society. These three monographs, one financed by the Milbank Fund, two issued by the Social Science Research Council, present the range and content of what has been achieved in this field. Although they follow the same general pattern of summing up past work, evaluating results, stating problems, and suggesting further research, they vary in scope and detail from general to more specific in the order listed above. Together they form a rather comprehensive synthesis of previous research efforts, critically appraised and set in proper perspective. In addition each is fruitful with leads for further investigation.

Whelpton's monograph traverses the whole range of major population topics—forecasts and estimates, official statistics, fertility and fecundity, mortality, migration, optimum size, and optimum composition of the population. The sacrifice of attention to minute detail seems justifiable since it permits a broader, more comprehensive, if less exhaustive, treatment. It also allows for more explicit statement of the practical implications of population theory and research. In connection with optimum size and composition of the population the matters of population policy and program are faced directly. In turn, practical ends are shown to demonstrate the urgency of certain supplementations to the Census. There is no lack of specificity on this point; if the 1940 Census does not enumerate "number of children ever born" and tabulate it by several categories, the fault will not be Whelpton's. At the conclusion of his final summary he designates the three matters on which population research should be concentrated in the near future. They are

1. The motives leading couples to want a given number of children and practice birth control accordingly.

2. The composition of the present distribution of population within the nation with the optimum distribution.

3. The changes which are taking place in the hereditary makeup of the population.

The monograph by Vance deals with a division of population research recently marked off and explored by the *Study of Population Redistribution*, with findings published as *Migration and Economic Opportunity* by Carter Goodrich and Others. It refers to internal migration but "goes beyond internal migration, however, in that it attempts to put this process in its economic setting of contrasting population and resource areas." The bulletin is remarkable for its clarity and logic. Propositions and corollaries are set forth where there are data to justify them; where these are lacking, hypotheses or postulates are stated. There follow suggested queries and sometimes proposed projects. The subjects treated are the relation of population redistribution to the general field of population; forces producing the redistribution —contrasting areas of economic opportunity and differential population increase; prospects of changing economic opportunity; and the equalizer of

unequal flow of population increase—internal migration. For each of these divisions there is a careful examination of data available and of previous attempts at their analysis. One especially adequate section is on data and research methodology dealing with income and levels of living.

The third monograph treats the problem formerly known as selectivity in migration, now more precisely defined and more agnostically named. It differs from the other monographs in including substantial, hitherto unpublished, original contributions of the author. The differentials investigated are age, sex, family status, physical health, mental health, intelligence, occupation, motivation, and assimilation. The results are inconclusive for any generalizations as to strength and direction of selectivity in migration. The only differential definitely established is for the specific factor of age. Valuable appendices include bibliographies of American, English, and German contributions as well as discussions of both Swedish and German sources of data and methods of analysis.

Margaret Jarman Hagood

University of North Carolina

Urban Blight and Slums, Economic and Legal Factors in Their Origin, Reclamation, and Prevention, by Mabel L. Walker. Cambridge: Harvard University Press. Harvard City Planning Studies, Volume XII. 1938. xvi, 442 pp. $4.00.

"Urban blight and slums" are terms used to describe a whole congeries of problems of diverse and heterogeneous character. The demarcation of a slum area for a city involves setting up a series of tests by which these areas of deteriorated housing may be segregated from the other residential sections of the city. In making generalizations for many cities, the complexities multiply, since each separate city is to a certain extent unique, with a structure and pattern of growth peculiar to itself. Because the problem of urban blight and slums is one of such extraordinary difficulty, Dr. Walker's method of approach deserves most careful attention.

The first part of this pioneer treatise on slums is of most vital interest to the student of city growth and structure, for in it Dr. Walker essays the task of defining the terms "slum" and "blighted area." She assembles the definitions of authorities, reproduces Henry Wright's classic description of patterns of blight, brings together scattered historical data relating to the genesis of decadent areas, presents case studies of some 14 cities in which certain characteristics of slum areas are described, and then indicates the economic drain of blighted areas and the relation of housing to the problem.

In the second part, numerous methods of attacking the problem of slums are discussed. The vital importance of replanning blocks so that the evils of single lot development will be overcome by community control of a whole block or group of blocks is shown by the late Henry Wright. Obstacles to

slum clearance imposed by over-valuation of land and problems of condemnation and demolition are analyzed. The relation of zoning to land values, the problems of land assembly, proposed rehabilitation measures, the theory of property taxation, tax exemption, and mortgage financing form the subject matter of successive chapters. Mr. A. C. Shire contributes a brilliant chapter that shows the loose organization of the home building industry. Federal, state, and local housing activities are also discussed.

The third main part, "The Attack on Slums and Unfit Housing in England and Holland," is a scholarly analysis, written entirely by Professor Richard U. Ratcliff of the University of Michigan. In this part the main emphasis is placed upon the legislative methods used in dealing with slums and their practical results.

Dr. Walker has performed a great service in assembling in one volume data relating to the diverse factors affecting slums and blighted areas in so many different cities. The strength of this volume—the great variety of subjects covered and the numerous authorities quoted—is, however, its principal weakness. The space allotted to each subject is so limited that it is impossible to develop the scientific possibilities latent in every field. Moreover, from the counsel of so many authorities, it is difficult to develop a unified, consistent attack on the problem of slums. Notwithstanding these shortcomings this pioneer work on the subject of slums is a welcome addition to the library in the growing field of housing and land economics.

HOMER HOYT

Federal Housing Administration

Farmers on Relief and Rehabilitation, by Berta Asch and A. R. Mangus. Washington, D. C.: Division of Social Research, Works Progress Administration. Research Monograph VIII. 1937. xx, 226 pp.

Rural Youth on Relief, by Bruce L. Melvin. Washington, D. C.: Division of Social Research, Works Progress Administration. Research Monograph XI. 1937. xvii, 112 pp.

Effects of the Works Program on Rural Relief, by Rebecca Farnham and Irene Link. Washington, D. C.: Division of Social Research, Works Progress Administration. Research Monograph XIII. 1938. xxiv, 115 pp.

In the past few years our newspapers, magazines, and books have fairly bulged with an ever increasing load of statistical data and comment relative to the relief problems of urban centers. By way of comparison, almost nothing has been written on rural relief problems, which, to be sure, involve fewer persons but are certainly no less tragic. These monographs focus attention on those problems.

Monograph VIII includes more than 100,000 rural relief cases spread

over 30 states. The cases are analyzed in terms of cause of distress, location of relief and rehabilitation cases, types and amounts of relief and rehabilitation, social characteristics of families involved, relationship to the land inhabited, production factors, and relief trends. The final chapter presents an evaluation of reconstruction programs.

Of importance in this monograph is the showing that in most cases "the need for outside aid was the result of long-standing agricultural maladjustments and adverse climatic conditions such as drought and flood." In light of this an examination is made of such Federal emergency measures as Emergency Relief Administration, Resettlement Administration, and Works Progress Administration. Then, to quote again, "the more fundamental measures for building a superior agrarian civilization in the United States are long-time measures, not planned for immediate results . . . . Successful rehabilitation cannot be accomplished without a continuing course of action, uninterrupted by sudden shifts of policy such as have characterized relief and rehabilitation programs during the depression years."

The most tragic picture is drawn in the monograph *Rural Youth on Relief*. In October, 1935, when agriculture seemed on the way to recovery, there were 625,000 youth in rural relief families. But this is not all. If one takes into account the assistance provided by the C.C.C., the W.P.A., and the Resettlement Administration, the youth in families receiving assistance included some 10 per cent of all rural youth in the United States.

The youth in relief families have been carefully analyzed in terms of location and concentration, age, color, sex, marital status, relation to head of household, educational status, and occupation. The plight of rural youth is shown to be largely the result of long-time trends—depletion of the soil, overcrowding of the land, and the prevalent system of farming. The conclusion is obvious: "The revival of industrial activities in the cities will have little direct effect on conditions in submarginal land areas . . . ." Moreover, "with the exception of the C.C.C., the Federal programs which offer the greatest possibilities for youth have been set up primarily in urban terms, and they are frequently not well adapted to rural areas."

Monograph XIII presents an analysis of families taken off the Emergency Relief Administration rolls between June and December, 1935. The analysis runs in terms of the number finding employment in private industry, the number finding employment on the Works Program, the number receiving assistance from the Resettlement Administration, the number returning to relief rolls, and the number in need but not receiving relief.

All three monographs have been intelligently planned and carefully prepared. At least they give the lie to the many stories alleging complete uselessness of W.P.A. These products are of genuine value.

Cleon O. Swayzee

University of Nebraska

Planning and Administration of Unemployment Compensation in the United States, by Bryce M. Stewart and Associates. New York: Industrial Relations Counselors, Inc. 1938. xiii, 665 pp. $4.00.

The task of surveying the beginnings which have been made in the development of a system of unemployment insurance in the United States is rendered most difficult by two circumstances. In the first place not one system but fifty-one subordinate jurisdictions under the general authority of a Federal act are in existence. The Federal activity is spread among three mutually independent agencies: the Social Security Board, the United States Employment Service, and the Bureau of Internal Revenue. In the second place changes in both legislation and procedures have occurred with great frequency, and in many cases these changes have been of considerable magnitude. In several instances state acts have been completely rewritten. Those proponents of the present Federal-state system who urged its adoption in the interest of experimentation by the states should be most happy. Variety has indeed been achieved. The resulting system, if it is proper to call it a system, resembles the colonial crazy quilt in more than one respect. The quilts, however, had some permanence of form after they were made.

The difficulties which have just been indicated prompt Mr. Stewart to remark in his introduction that "the many changes in law and procedure and the difficulties experienced in securing accurate recent data on some phases of the work have necessitated many revisions in the manuscript. These have delayed publication and have made it impracticable to bring up to date certain phases of the first three parts of the study." He asks that the reader be indulgent and indicates that the final portion of the study does draw upon developments during the early months of 1938. It is very easy for one who has been intimately connected with the program as a regional representative of the Bureau of Unemployment Compensation to grant the request for indulgence. When policies change from day to day, when instructions in regard to grants continually vary, when the Bureau is constantly struggling with the problem of decentralization and hence the responsibilities of field personnel are changed with most confusing frequency, it is almost impossible to keep current and properly convey the Bureau's "current thinking" to the states. One should not, therefore, be too critical of an attempt to survey the field and make some evaluation of the work which has been done. This same understanding of the shifting scene tempers the decided disappointment over the failure of the first two parts of the study to probe more deeply into the problems connected with legislation, organization, and procedures in the states.

The first two parts of the study are almost entirely descriptive. The author and his associates have avoided a considerable part of the problem of diversity by selecting five of the fifty-one state and territorial units and confining attention to their laws and procedures. In connection with an excellent presentation of the organization and development of the Federal and selected

state agencies with which the first six chapters are concerned, the author points out a number of outstanding problems and indicates in general the difficulties attending their solution. Chief among them are those connected with the effective coordination between the Social Security Board, the United States Employment Service, and the Bureau of Internal Revenue; the task of the Board in supervising fifty-one diverse state acts; the weaknesses of the controls which the Board may exercise, particularly those relating to personnel and to the protection of the solvency of state funds; inadequate provisions for securing accurate and comparable statistical data; and the need for developing satisfactory interstate benefit payment arrangements. The opinion is expressed that some of these may prove insuperable obstacles and that legislative modification of present acts will be necessary.

The last four chapters of Part I are concerned with administrative costs. Unfortunately the data do not extend beyond the middle of 1937 in any case and, for the greater part, cover only the period to the end of 1936. The picture, therefore, does not include the decided increase in costs made necessary by the expansion of state employment services and by the establishment of benefit payment units in the state agencies. The author contends that Federal appropriations for administration will have to be increased and points out the British provision that allows administrative costs to amount to 12½ per cent of contributions to the fund. The Board has recently adopted the policy of limiting grants for both employment service expansion and unemployment compensation to 10 per cent of contributions. One can agree with Mr. Stewart that the cost will probably amount to from 65 to 70 millions per year. At the same time a careful examination of expenditures by the states leads to the firm conviction that the Board was wise in instituting the "line item" type of budget against which the study raises some objections. It may hamper the state officials in their planning to some extent. On the other hand, many states have not shown the ability even to forecast their needs three months ahead or to present adequate justification for requests which were contained in their budgets. Bureau officials have often experienced difficulty in getting states to decide on matters of equipment and personnel in time to permit installation prior to the time when both were actually needed for operation. The abandonment of line control in many states would, under the conditions obtaining at present, destroy the ability of the Board to keep expenditures within fairly proper limits and might well lead to a first-class series of scandals.

Part II of the study is devoted to describing the procedures which had been adopted by the Federal agencies and the five selected states up to the time of its conclusion. Since that time numerous changes have been made. It is impossible to present a current picture on account of this endless experimentation. It requires constant care on the part of field personnel to keep up with Bureau policies. Forms are modified, supplemental fiscal instructions are issued, recommended benefit procedures follow one another, and in addition a constant stream of suggestions on minor matters is issued. It is true

that the states have settled down in regard to coverage and contribution procedures, but many changes are still occurring in regard to employee wage reporting. States change from slip reporting to list reporting and some change back again. Benefit procedures have been revised in a merry whirl. The great urge now is toward simplification. About all that can be said for this phase of the study is that it portrays what was. What is can only be stated in terms of today, and what will be must await tomorrow. One can live with six state agencies and still get left behind between visits.

The summary and evaluation which constitute the third portion of the study are worthy of thoughtful consideration. The author is careful to point out that "any effort to appraise the present system is hampered by the brief span during which it has functioned" and that the recent beginning of benefit payment prevents the application of "this strongest test of efficiency." Nevertheless, certain fundamental criticisms are stated, and from them conclusions are drawn which appear to be amply justified both by the findings of the study and in the light of subsequent developments. Legislation in the field was passed by the states in a very hurried fashion and in varied form. As a result there have arisen "administrative problems that are practically insuperable." The Federal legislation failed to provide for unified administration of the act. The resulting bickering among the Federal agencies is fast producing an impossible situation. The adoption of decentralized administration ignored both the foreign experience in the field and our own experience with workmen's compensation. Accordingly "it seems inevitable that a much greater measure of coordination and centralization of unemployment compensation must take place." The delays and conflicts attendant upon the commission type of administration lead to the recommendation that the single administrator, both in Federal and in state administration "should prove most efficient." These administrators should be freed from unwarranted interference by other governmental departments and should have the assistance of appropriate advisory councils. Personnel has constituted quite a problem, particularly in state agencies. Civil service is held to be more desirable than the patronage system, but it is recognized that civil service authorities must be competent and well equipped. I think it appropriate to remark that political influence is a very insidious thing and that neither the Federal Civil Service Commission nor those in charge of state plans could easily qualify as Caesar's wife. My own observation has been that in few if any of the states has it been possible to secure a complete staff of competent people without political interference. It might also be possible to cite instances of grossly incompetent Federal employees whose removal does not appear possible.

Mr. Stewart's analysis of actuarial and financial considerations leads him to question the wisdom of exempting employers of less than eight employees and to indicate the hazards attending small and concentrated coverage. He does not believe that "the actuarial problem has received the consideration it deserves." In this connection he raises the whole question of the solvency of funds and the possible effects of merit rating, adjustment of contributions

to payroll and of benefits to earnings. The requirement of employee contributions and the supplementing of funds by Federal grants-in-aid are also discussed as possible necessities. In this connection it should be noted that several states are now paying out more in benefits than they are currently receiving in contributions.

Under major procedures the author discusses the collection and recording of contributions, the determination of benefit, proof of unemployment, and payment of benefit. He first disposes of the oft advocated stamp system and then discusses the importance of prompt and frequent collection. Doubt is expressed that quarterly collections will suffice. The comments on benefit determination are largely concerned with present complicated and often inequitable provisions. Benefit rates based upon recent full time earnings are favored as against an average based upon quarterly earnings during a two-year base period. Present methods for handling partial unemployment are faulty, but no acceptable solution has been found. Separation notices in lieu of employee wage reports are condemned, and improved and more frequent reporting recommended. The current practice of fixing the duration of benefits by the ratio principle is simple administratively but probably will be questioned. The submission by claimants of proof of unemployment places a heavy strain on agencies in the event of mass layoffs. The normal procedures should be relaxed to facilitate prompt registration and payment. It is predicted that many states will have difficulty for a time at least "in the matter of the prompt payment of benefits." The opinion has been more than vindicated.

In conclusion the author summarizes the more important criticisms to which attention has been drawn. "Despite many discouragements, some alert and competent officials, federal and state, are exerting themselves to the utmost to make this complicated, disjointed, inflexible organization operate efficiently. A hard road lies ahead of them. Laws and procedures are already being altered and patchwork changes will continue, perhaps for many years. It may be predicted that complete reconstruction on a national basis will come, either by the evolutionary process or by drastic action in time of stress." In other words we need a real federally administered nation-wide system based upon sound principles. Mr. Stewart and his associates have struck some sturdy blows. Perhaps this and further confirmatory studies will carry the necessary conviction to the Congress and the states before the necessity for drastic action precipitates a too sudden and hurried readjustment.

Burton R. Morley

University of Alabama

Differentials in Industrial Wages and Hours in the United States, by M. Ada Beney. New York: National Industrial Conference Board, Inc. N.I.C.B. Studies Number 239. March, 1938. xviii, 203 pp. $3.50.

This publication of the Conference Board presents data on the differen-

tials which exist in wages and hours in eight industries among geographic regions, between large and small communities, and between large and small establishments. The industries studied were cotton, foundries and machine shops, furniture, lumber, printing, electricity, gas, and paper and pulp. The proportion of total employment represented by the reporting concerns varied from 4 per cent for the lumber industry in the East to 64 per cent for the paper and pulp industry in the South. All data are shown separately for each industry and are presented in the form of arithmetic averages throughout the study. Averages are given for certain specified occupations in some industries as well as for all occupations combined.

Discussion is limited to three chapters covering 40 pages. These chapters deal with the methods used, the extent of wage and hour differentials, and the reasons for wage differentials. Substantial variations were found in earnings among the major geographic regions. Earnings in the Far West were, on the whole, the highest, and those in the South the lowest. Much wider variations were found in some industries than in others. In general, earnings in large cities were higher than in small communities, but the correlation was far from perfect. Workers in large establishments appear to earn the highest wages.

The author discusses briefly a number of possible explanations of wage differentials. Only with respect to the cost of living is a detailed explanation attempted. Wage differentials were compared with differences in living costs, using the same standard of living. Both geographic and population differentials in earnings were found to be greater than corresponding differentials in living costs.

Although it has its limitations, as the author is careful to point out, this study is of particular interest at the present time when the passage and administration of the Federal Fair Labor Standards Act have increased the need for a better understanding of the nature and extent of wage and hour differentials.

THEODORE A. VEENSTRA

Pennsylvania Department of Labor and Industry

The National Railroad Adjustment Board, by William H. Spencer. Chicago, Illinois: The University of Chicago Press. Studies in Business Administration, Volume VIII, Number 3. 1938. ix, 65 pp. $1.00.

William H. Spencer, Professor of Business Law and Dean of the School of Business of the University of Chicago, is well equipped to review the work of the National Railroad Adjustment Board for the three-and-one-half-year period since its inception. In the foreword he tells us that the Board "is the latest piece of machinery devised by the Congress of the United States to assist in the settlement of railway labor disputes . . . . It has particular interest to the public at present in view of the contention, which has been voiced by many since the Supreme Court sustained the

validity of the National Labor Relations Act, that the machinery now established for the settlement of industrial disputes in the railway industry should be extended to industry generally." Although Dean Spencer does not discuss this particular contention in his monograph, he concludes that the Board is "an extremely valuable piece of machinery for the settlement of disputes arising out of the interpretation and application of collective agreements between carriers and railway labor organizations."

The monograph is primarily a descriptive account of the development and success of mediation procedure under the various transportation acts with particular emphasis on the Railway Labor Act of 1926 and its amendment in 1934. The organization, powers, procedures, and practices of the Adjustment Board are described in detail with an appraisal of these activities. Although it is useful to have a description in relatively brief compass of the various activities of the Board, a more intimate account of the awards of the Board would be very illuminating. Dean Spencer states, however, that there is "as yet no yardstick by which one can pass any adequate judgment on the quality of the work of the Board. It is as yet futile to inquire whether the Board is pro labor or pro carrier. The fact that the Board, when assisted by referees, has sustained the position of employees in approximately 69 per cent of its awards is only slight, if any, evidence that the referees have been biased in favor of employees . . . . In any event time alone will tell whether the awards work out substantial justice for all parties concerned.

Perhaps the most interesting section of the monograph concerns the appointment of referees in particular disputes. Dean Spencer has himself served as one of these referees. The Railway Labor Act requires that, as a condition of referring a dispute to the Adjustment Board, the parties shall have first endeavored to settle it in conference on the property of the carrier involved. For purposes of operation the Board, which consists of 36 members, is organized into four divisions, each division being equally representative of the participating labor organizations and of the carriers concerned. In practice, Dean Spencer tells us that the various divisions have been unable to reach a decision in about one-third of the disputes that are referred to them. In such cases a referee is selected to sit with the division as a member and make an award.

Since the Board began to function in 1934, 12 different persons have been appointed in various disputes. "Aside from the question of bias—an issue on which the writer does not care to express a judgment—the persons appointed as referees, with one or two exceptions, have been very competent and effective in dealing with the type of controversies coming before the Adjustment Board."

To sum up, Dean Spencer's monograph is a careful, descriptive account of an important agency for adjusting industrial disputes and, as such, is recommended to all students of industrial relations.

W. Rupert Maclaurin

Massachusetts Institute of Technology

The Income Structure of the United States, by Maurice Leven, assisted by Kathryn Robertson Wright. Washington, D. C.: The Institute of Economics of The Brookings Institution. Publication No. 74. 1938. x, 177 pp. $1.50.

"The purpose of the present study is to contribute toward the clarification of thought in the important field of income and its distribution. No attempt will be made to say anything essentially new. Rather, the effort will be directed toward pointing out some simple—and what may appear obvious—truths relating to the income structure and to the statistics pertaining thereto" (p. 1). To this end Dr. Leven proceeds to consider in the first part of the book what he calls the determinants of income—occupation, industry, geographic location, age, color, sex; and in the latter part, the changes in the income structure since 1929. In addition to these two major topics the book treats briefly of the influence of group action, the variations due to ebb and flow of business activity, and "secondary income," i.e., gift and transfer items.

Throughout, the discussion is on an exceedingly superficial level. Although many bodies of statistical data are employed to illustrate the various points made, no serious analyses of the data are attempted. The figures presented in the tables, charts, and appendix are described, and the more obvious implications drawn. Further than this, Dr. Leven does not go. Conspicuous by their absence are analyses of the character and reliability of the data presented. The reviewer noted only two statements of this nature (p. 85, footnote; p. 126). The second of these points out that, since the Financial Survey of Urban Housing "was conducted in 1934, the reliability of the information [from this survey] regarding family income in 1929 may be affected by the element of human memory perhaps more than for 1933 or 1932." Six pages preceding this statement, unpublished data were presented on the professional incomes of physicians and lawyers in 1929 and 1936. The data for both years for lawyers, and probably for physicians as well, were obtained through questionnaires mailed in 1937. Yet there is no mention of this fact or of its possible implications as to the reliability of the data.

In discussing secondary income, Dr. Leven presents a table based on *America's Capacity to Consume*, which gives, by family income classes, the total and average "income originally received" and "approximate income consumed." The grouping of families is in terms of the first of these concepts—income received. The differences among the income levels are considerably greater for average income received than for average income consumed. From this Dr. Leven implies that consumption is more equally distributed than income. Now this probably is a correct statement. But it does not follow from the table. The error involved has been frequently pointed out[1] but is

[1] See, for example, Harold Hotelling, review of *The Triumph of Mediocrity in Business*, by Horace Secrist, this JOURNAL, XXVIII (December, 1933), pp. 463–65; and the subsequent discussion, this JOURNAL, XXIX (June, 1934), pp. 196–200.

nonetheless continually being made. To classify families by income received and then to compare the dispersion of average income received with that of average income consumed is a biased procedure that tends to show income received the more unequally distributed. For a valid comparison, it would be necessary to compare a distribution of families by size of income received with a similar distribution by size of income consumed.

Research workers in the income distribution field will find scarcely anything that is new or significant in this little book. But to criticize the book on this score would be unfair, for it is no part of its announced purpose. The neophyte, on the other hand, will find his understanding of the meaning and limitations of data on the distribution of income considerably enhanced.

From this point of view, the major virtue of the book is the emphasis placed on the interrelation of various factors affecting the incomes of individuals or families and on the implication that differences which appear when income recipients are grouped by one factor may not be attributable to that factor but rather to others correlated with it. The major shortcoming is perhaps the failure to point out that a given degree of inequality means one thing if each individual occupies the same relative position in the distribution, year after year, and a very different thing if there is considerable shifting in relative position from year to year.

MILTON FRIEDMAN

National Bureau of Economic Research

Operating Results of Department and Specialty Stores in 1937, by Carl N. Schmalz. Boston, Massachusetts: Bureau of Business Research, Harvard University. Publication of the Graduate School of Business Administration. Volume XXV, Number 3. May, 1938. Bulletin Number 106. vi, 34 pp. $2.50.

One of the things that Carl N. Schmalz of the Bureau of Business Research at Harvard University tells in his *Operating Results of Department and Specialty Stores in 1937* is that with the equipment at hand those of us in the department and specialty store fields should be able to navigate our ship of business safely through the rocks and whirlpools that are in our path. Had we given close study to the facts at hand, many of us would not have been caught flatfooted in the precipitous sales decline of late 1937. But let us see how we could have gotten through the Scylla and Charybdis of 1937 business without casualty. Mr. Schmalz points out that on January 1, 1937 (with November figures the latest available) we could hardly have had any indication of what was coming. The sales curves—both real and dollar—were still mounting; the ratio of stock to sales was very low; the *Annalist* Index of Business Activity and the Federal Reserve Index of Industrial Production were both encouraging. The only straws in the wind were that retail prices were high and that real sales and general business activity had been on the "up" for 36 months or more.

On June first dollar sales had leveled off; real sales were definitely lower and with no indication of a break in the trend; and "both the *Annalist* Index and Federal Reserve Index had given some indication that they were approaching peaks." The only reassuring evidence at that time was that the stock-to-sales ratio was steady at 14 per cent above its November point. In other words, by June first of 1937 the danger signals were flying. Yet for the most part they were ignored, and consequently buying was not curtailed noticeably until September, when it was too late to prevent a heavy stock condition at the end of the year.

The report, based on data from 571 firms doing 37 per cent of the total sales of all department and specialty stores in 1937, points out that real or physical sales were substantially the same as in 1936, although the stores received about 4 per cent more in dollars for them. Margin rates were about on a par with those of 1936.

Increased expenses were very marked in 1937. Over a period of time, the study says, the year-to-year changes in expense other than payroll and taxes largely offset one another. In 1937 the higher taxes resulting from increased Government spending, social security legislation, and other circumstances for the most part beyond the control of store executives, increased the cost of doing business in that year.

As for earnings, the study finds that profitable stores "constituted a proportion of total stores noticeably lower than in 1936." For department stores as a whole, net profit in percentage of sales was .9 per cent less for 1937 than for 1936. It should be noted, however, that only in stores with less than $150,000 sales volume per year were losses typical.

Strangely enough, the delivery problem turns out to be both a boon and a bane to the department stores. Extra services are, broadly speaking, their basic *raisons d'être;* yet the report finds that a high ratio of delivered sales—a typical department store "extra"—to total sales results in a high percentage of returns.

The study finds little change in the total high cost per transaction. The year 1937 found the average varying from 56 cents for the smaller stores to 81 cents for the larger stores.

The problem of labor relations has come strongly to the fore in the last few years in the distribution field as well as in the industrial field. The Harvard study foresees a continuation of employee unrest as well as higher labor costs due to unionization.

Although industry and research have walked hand-in-hand for years, in the field of distribution, at least as far as department stores are concerned, there has been painfully little research on problems of basic importance. Mr. Schmalz puts forward the questions: What is the most efficient and profitable size of a department store for each of a series of sizes of markets? What combination of merchandise and service departments ordinarily produces the best results in each of a series of sets of circumstances? These and other fundamental questions we should know the answers to—but we don't.

Now let us quickly review our 1937 record. First of all, we did little to avert the cyclical downturn in business. Next, we did not advance at all in unit sales over the previous year; margin rates showed no change; the number of stores operating at a profit was considerably smaller; the cost per transaction was still very high with practically no change compared to 1936; the labor situation was still in a state of unrest; stores had not done much to adapt themselves to changing consumer demand; little progress was made in simplifying store system; not nearly enough research work was undertaken; and, finally, few if any steps were taken to offset the inevitable shift from luxury to practical goods in a period of depression. All of which means that there are many well-defined problems that department stores will have to solve if they are to continue as important factors in distribution.

The report goes further to present some detailed results on department stores which should prove valuable.

First of all it points out that for department stores the rate of net profit varies more or less directly with the size of the store. It finds that the most profitable stores, however, are tending more and more to be stores of moderate size. Both gross margin rates and rates of stock turn were found to be the same or lower in 1937 than they were in 1936.

The following were the results of the study on payrolls:

1. Payroll expense was generally higher as a percentage of sales in 1937 than 1936.
2. The percentage of payroll expense was higher for large stores than for smaller stores in line with such a trend in recent years.
3. The increase in the average percentages from 1936 to 1937 tended to be larger for stores of $1,000,000 volume or more than for smaller ones.
4. The percentage of salespeople varies inversely with the size of the store.
5. The higher percentage payroll cost in 1937 must have been due to higher payroll cost per employee.
6. Average compensation for full-time work was substantially higher for non-selling employees than for salespeople in 12 selected department stores.
7. The number of employees was reduced steadily in these 12 stores from 1929 through 1932; in 1936, however, there were 4 per cent more workers employed than in 1929, and, in 1937, 8 per cent more.
8. Average compensation per full-time employee rose in 1937—for salespeople, about 5 per cent, and for non-selling help, 4.5 per cent.
9. Sales per person, all employees considered, were .5 per cent higher in 1937 over 1936.

In conclusion a short résumé of the detailed findings regarding specialty stores should not be overlooked.

The average percentage of sales increase for specialty stores in 1937 over 1936 was 4 per cent—about the same as for department stores. The rate of earnings decreased approximately the same as department stores also—about .9 per cent of sales. Gross margins, however, decreased three times

as much as for the department stores—namely, .3 per cent, while total expense increased .6 per cent to .7 per cent of sales. Specialty stores, like department stores, show profits varying directly with size, but the department store tendency is much more pronounced.

Stock turn rates, percentages of customer returns, sales per square foot of total space, percentage of credit sales to total sales all seem to vary with size. It is noteworthy that for specialty stores the smaller units have a distinctly higher percentage of cash discounts to sales than the larger stores.

To sum up, the report declares that the most significant characteristics of the operation of department and specialty stores in 1937 were, first, the cyclical changes in general business and retail sales; second, the heavier tax burden; and, lastly, higher labor costs.

IRWIN D. WOLF
LEWIS M. SILVERSTEIN

Kaufmann Department Stores, Inc.
Pittsburgh, Pennsylvania

Marketing of Raw Cotton in India, by M. L. Dantwala. New York: Longmans, Green and Company. Studies in Indian Economics, No. 11. 1937. xxv, 268 pp. $3.75.

Mr. Dantwala's book fills an important need for those wishing a clearer understanding of the world cotton situation, and especially those seeking more information about India, the second largest cotton producing country in the world. The author says his objective is to examine the movement of raw cotton from the farm to the exchange which, according to the author's treatment, begins with cotton picking and extends through the Bombay cotton futures market. The fact is, the book has a wider scope than that. The discussion of such topics as India's place in the cotton world, defects and malpractices in marketing, co-operative marketing, agricultural finance, and cotton prices gives the author ample opportunity to express his views and philosophies on a number of subjects, and especially agricultural economics.

The book has two major objectives. One is to give a description and analysis of cotton markets and marketing processes, and the other is reform. The will to reform is the stronger of the two objectives. He says, "the main object of the study of existing methods is to see whether the whole process of marketing can be replanned and reorganized."

The two major means of improving cotton marketing methods in India in the opinion of the author are: (1) greatly increased co-operation on the part of farmers, especially in pooling their cotton for market and in the provision of market credit to prevent their cotton from being dumped on the market; and (2) government service, regulation, and supervision. Accomplishments of co-operative cotton marketing in the United States and the work of the United States Department of Agriculture in the way of regulation and service are held up as very worthy objectives for India.

The author finds in fact that the spread between what the farmer gets for his cotton and the price it brings in Bombay scarcely pays the legitimate costs of marketing. The need for reform then is not to prevent excess profits of middlemen but to eliminate malpractices, such as inadequate price quotations in local markets, mixing, watering, disputes, and confusion in weighing engendered by excessive competition and not the lack of it.

The real value of the book lies in the description of Indian cotton markets and marketing. Here the foreign reader finds himself wishing for more detail, more concrete material, some well-chosen photographs, and examples. The description of the local markets is the best. The major problems of marketing in India, as in America, have essentially the same causes—lack of knowledge and information about cotton and cotton marketing, small volume, and inadequate organization. The discussion of cotton futures markets and especially of the Bombay market leaves much to be desired.

The chapter on cotton prices makes no contribution on that subject to an American audience of economists.

Nothwithstanding the defects pointed out, the book is a distinct contribution to the world's literature on cotton marketing.

A. B. Cox

University of Texas

Principles of Engineering Economy, Revised Edition, by Eugene L. Grant. New York: The Ronald Press Company. 1938. xix, 431 pp. $3.75.

Principles of Engineering Economy—Problems, by Eugene L. Grant. New York: The Ronald Press Company. 1938. iii, 142 pp. $1.00. (In Combination, $4.25).

This comprehensive revision of a text already recognized as of high quality calls less for detailed review than for some reflection upon the nature and scope of the subject of which it treats. Professor Grant has collected a rich variety of illustrative material from many fields of engineering. His long experience in teaching this subject is evident from the extent to which beginners' errors are anticipated. The result is a "how-to-do-it" book combining theoretical clarity with the salty flavor of practical life. Students who respond but feebly to the one may yet be lured by the other.

Engineering economy is the "cutting edge" of economic judgment as applied to a wide variety of investments in physical equipment. Such investments are typically large for production rather than consumption purposes. Decisions about them usually constitute parts of a wider economic judgment, either by an entrepreneur or a governmental body. At the core of each problem of engineering economy lies a mathematical relationship, usually simple. This core of mathematical relationships could be expounded in a brief and rigorous treatise. Once a few basic concepts have been mastered, such as that of interest, depreciation, increment cost, capacity and load factor, the rest follows inevitably.

The art of teaching the subject to engineering students is a different matter. Given time, experience, and industry, the theoretical basis can be presented in an illuminating manner through the medium of problems drawn from life. More difficult, because indeterminate, is the question of how far the assumptions of theory are to be left intact and unquestioned; or how far, on the contrary, their wider economic implications are to be examined. The nature of costs, the theory of interest, the complexities of demographic statistics, corporation finance—these are some of the problems which present themselves to the student who seeks to penetrate behind the opaque simplicity of the mathematical expressions for least cost, economic life, and the like.

Professor Grant has made an intelligent compromise, since a volume of the scope intended scarcely could follow out all these implications. As a practical treatise on "the lore of nicely calculated less and more" the book is unexcelled. Its chief danger is that the student who has mastered this segment should think he thereby has exhausted all that is profitable in the field of economics.

An accompanying volume of problems forms a valuable teaching aid.

B. A. THRESHER

Massachusetts Institute of Technology

Psychology and the Motorist, by Herbert A. Toops and S. Edson Haven. Columbus, Ohio: R. G. Adams and Company. 1938. vi, 265 pp. $2.00.

This volume adds to the voluminous literature of suggestions for solving the traffic problem. An interview study is used as a point of departure, followed by criticisms and suggestions. The field covered includes accident statistics, the opinion of the driving public, the driver, the pedestrian, highways, city planning, signs, signals, parking, car construction, law enforcement, research, and plans and suggestions for ideal highways. This material is treated with a rather general and apparently intentional lack of consideration of the practical aspect.

After an introduction which pleads for the value of lay opinion, the authors launch into a discussion of accident records. It is held that in spite of poor records the accident prone driver can be identified. The suggestions of an analysis of the individual's chance of accident and of an index of driver skill in terms of actual driving habits on the road seem justified.

"What's Wrong with the Driver" discusses in quite acceptable fashion the role of judgments and perceptions in driving an automobile, and "The Driver at the Wheel" is a similar treatment of emotional reactions, habits, fatigue, attitudes, and other similar topics. "The Dangerous Pedestrian" suggests controlling or licensing pedestrians, although some of the practical aspects of pedestrian psychology are ignored. "Motives and Incentives" is essentially a plea that "reward is more promising than punishment." A

number of motivating devices are proposed, some of which have already proved practical. The authors hold that highways should be fitted to people rather than the reverse and define an ideal highway as a recreational device which should be equipped with other facilities such as "sleeping stations."

In "Signs, Signals, and Omens" the authors discuss probabilities of seeing and the conditions favorable to observance of traffic signs. The suggestion is made by the authors that a characteristic contour should be determined for certain signs, apparently not realizing that such an attempt has been made.

In "Consumers' Specifications" it is pointed out that the modern car owner desires essentially a house on wheels. This results from the large number of uses to which those interviewed desired to put their car. The idea is advanced that auto license numbers should correspond with telephone numbers and the initials of the driver. The suggestion that permanent plates be issued is one that has been tried out in one state for a couple of years with apparent success.

In the final chapter suggestions are made for research on the problem. Three major suggestions advanced are co-operation of highway departments, co-ordination of reporting in some central agency, and finally a privately supported research bureau. The book is easy reading and often entertaining.

T. W. Forbes

Yale Bureau for Street Traffic Research

Trade Associations in Law and Business, by Benjamin S. Kirsh, in collaboration with Harold Roland Shapiro. New York: Central Book Company. 1938. 399 pp. $5.00.

This guide to trade association practices and related laws covers statistical services, uniform cost accounting, trade practices, standardization, credit, boycotts, patents, basing-point systems, collective purchasing, and foreign trade. The author scarcely considers how these activities relate to market control. Aside from some treatment of basing-point systems, price policy is not discussed. Indeed, there is no mention of factors limiting competition in different industries.

To Kirsh, a trade association is a means of promoting "the effective operation of economic forces by permitting free interplay of independent individual judgment and action, and by requiring a high level of competitive conduct." Without such associations, the author holds, industry faces the undesirable alternatives—further trustification or additional Government regulation and participation. To him, as to Herbert Hoover, the trade association is a method of providing small businesses with services "more or less equivalent to those which big business can accumulate for itself." But to be effective greater power is needed. Although he does not define what he means by "cutthroat competition" or by "chaos in production and

price," the author favors allowing trade groups further legal authority to eliminate these evils. Yet he overlooks the immoderate action of producers' groups as Code authorities in regulating price and production policies in their respective industries.

Unfortunately, the treatment of the legal position of the trade association is not coupled with an economic analysis of individual industries in terms of number of producers, type of demand, conditions of sale, fluctuations in demand, overhead costs, overcapacity, and the like. Despite these deficiencies, the study is a very useful handbook on the law dealing with monopoly and restraint of trade; it brings the material up to the fall of 1938.

GLENN E. MCLAUGHLIN

University of Pittsburgh

The Middlesex Canal, 1793–1860, by Christopher Roberts. Cambridge: Harvard University Press. Harvard Economic Studies, Volume LXI. 1938. xii, 252 pp. $3.00.

Mr. Roberts' book is a painstaking and careful effort to present with great detail the circumstances surrounding the construction and operation of an early inland transportation system and its importance to the economic development of New England. The Middlesex Canal system, which, when completed in 1814, linked Concord in New Hampshire with Boston, was a pioneer institution, both as an engineering work and as a business enterprise. It represented an early venture in the corporate form of business organization in this country. And it seems to be with an awareness of the contribution of the experience gained by the venture to later business enterprise and problems that Mr. Roberts proceeds to tell his story.

We have here, then, an account of major engineering difficulties encountered, together with practical problems of construction; a description of the economic environment of which the enterprise was a part; methods of hiring labor and labor contracts; the working out of business methods, and techniques developed to guide the relationship between directors and hired executives. The latter was obviously a problem of prime importance for the early corporation, and the author is quite right in pointing out that experience gained in developing these difficult processes was naturally of considerable value to the business concerns which were to follow.

Since this book is based very largely on original documents and business records of the period, it contains a wealth of data, statistical and otherwise, on transportation rates, both water and overland, toll charges, labor costs and conditions of employment, volume of shipments, etc., all of which will assist materially the work of the economic historian of the future. An examination of the bibliography reveals the difficulties of his task, and we can well be grateful to Mr. Roberts for making available so much manu-

script evidence bearing on early transportation problems and on business methods and promotion.

The story of the Middlesex Canal is extremely useful but is not, perhaps, as pointed as it might be. The author's estimate of the importance of his project is stated in his preface: "The value of an intensive study of an economic microcosm through time may be said to arise, however, less from the details in themselves than from the insight which they afford into the nature of the very process of economic adaptation and change." In this aim he has not been completely successful, for it is often the detail as much as the insight that claims his attention. For example, it is apparent from the lists of directors named in Appendix J that the direction of the canal had passed to a group of Boston business men who participated, not only in the control of the Lowell cotton mills and in the Locks and Canal Company of that city, but also in the large-scale cotton corporations throughout New England and in railways, banks, and insurance companies. This is not unimportant, and such a relationship might well have been discussed explicitly. It is made clear that the Middlesex Canal could not withstand the competition offered by the new railroads after 1835, especially the Boston and Lowell road. But more light might have been thrown on the nature of this competition had Mr. Roberts emphasized that William Appleton and George Kuhn, who were directors of the Middlesex Canal Company, were also directors of the Boston and Lowell Railroad, and that Ebenezer Andrews, also a director of the Canal Company, was likewise interested in the multifarious activities of the Boston group of business men referred to above, such men as the Appletons, Lowells, Jacksons, Cabots, Sturgis, George Kuhn, and many others.

The inclusion of a map indicating the canal route, railways, and manufacturing centers would have been helpful to the reader.

Vera Shlakman

Queens College

Business Enterprise in the American Revolutionary Era, by Robert A. East. New York: Columbia University Press. London: P. S. King & Son, Ltd. Studies in History, Economics and Public Law, Edited by the Faculty of Political Science of Columbia University. Number 439. 1938. 387 pp. $4.25.

The conventional way of handling the economic history of the period following the American Revolution has been to emphasize the destructive consequences to our trade resulting from our elimination from the British mercantilist system, and to dwell upon the commercial paralysis and financial irresponsibility occasioned by the weakness of the national government under the Articles of Confederation. This picture of chaos and stagnation is then contrasted with the regime of orderly and swift progress brought into

being with the adoption of the Federal Constitution and the Hamiltonian policies. Without prejudging the accuracy of this interpretation of the period, it may be remarked that (1) the conception of economic history embodied therein is essentially a political one, and that (2) the one-sided conclusion might be drawn that constitutional provisions and administrative policies determine the character of economic institutions and relationships. It is the purpose of Mr. East's book to inquire into the origins of corporate and other big business enterprises, and in doing so he marshals an imposing array of evidence to establish the fact that the *novi homines* in business, and the new institutions through which they operated, were really thrown up in the decade preceding the adoption of the Constitution. Alexander Hamilton's ideas were "not to materialize for another decade" and "he was then to appear more truly as the spokesman for, rather than as the creator of, a new business element."

The growth of more modern economic institutions in this period is seen most clearly in the development of new mechanisms to facilitate investment. The beginnings of joint-stock commercial banking on this continent are found at this time, and equally significant was the multiplication of joint-stock enterprises in land speculation, internal communication projects, and even manufactures. The shift was away from the idea of personally supervised investments and personal lending to institutional management of investments, although many decades were yet to pass before the old-style merchant-capitalist would be removed from his central position in the investment system.

The changes in business behavior were stimulated by the change in the psychological tempo of the people; the war had made people "think, speak and act in a line far beyond that to which they had been accustomed," and overcame that "great reluctance to innovation, so remarkable in old communities." The war had also presented unusual opportunities to a new, young group of business men, who profited therefrom, and emerged with a taste and aptitude for large affairs and a national outlook. This group was reinforced by those who had "gained by the consolidating influences of the 'eighties and by the unequal benefits conferred by the Hamiltonian measures." Such was the climate of opinion produced by the revolutionary decades that this new business leadership was able to interest the older beneficiaries of colonial wealth accumulation in supporting their new enterprises; for instance, Gouverneur Morris pointed out in 1785 that some of the chief subscribers to the Bank of North America no longer were active in business themselves. The author emphasizes his conclusion that it was the social forces released by the revolutionary struggle, rather than isolated individuals like Robert Morris and Alexander Hamilton, which moulded the business habits and business mentality of the times.

In summary it may be stated that the author's method of approach to the history of this period, namely of concentrating upon what he calls the

"constructive" rather than the "destructive" forces at work, achieves the following:

1. It establishes the continuity of business development from the colonial economy to the postwar system with a mass of case histories.

2. It shows the Revolutionary War to have been the *deus ex machina* of great changes in business psychology and methods in the direction of business "freedom," pooled endeavors, and greater sophistication in credit and investment practices.

3. It presents the period of the eighties as a period of significant economic experimentation, adjustment, and consolidation, rather than as regressive in character and barren of achievement.

4. It offers a fuller insight into the complex of dynamic economic forces of which the struggle over the Federal Constitution was the most vivid public expression.

Max Gideonse

Rutgers University

PUBLICATIONS RECEIVED*

Allen, R. G. D. Mathematical Analysis for Economists. New York and London: The Macmillan Company. 1938. xv, 548 pp. $9.00.

American Association of Collegiate Schools of Business. Proceedings of the 20th Annual Meeting. University of Illinois, Urbana, Illinois. April 21, 22, and 23, 1938.

Anderson, Montgomery D. Dynamic Theory of Wealth Distribution. Gainesville: The University of Florida Press. 1938. x, 243 pp. $3.00.

Backman, Jules. Government Price-Fixing. New York: Pitman Publishing Corporation. 1938. xi, 304 pp. $3.00.

Bernonville, Léo Dugé de. Initiation a l'Analyse statistique. Paris: Librairie Générale de Droit et de Jurisprudence. 1939. 232 pp.

Brieger, E. After-Care and Rehabilitation, Principles and Practice. Published by *The British Journal of Tuberculosis* as a special supplement, October, 1937. 142 pp.

Brown, Esther Lucile. Lawyers and the Promotion of Justice. New York: Russell Sage Foundation. 1938. 302 pp. $1.00.

Brüschweiler, Carl. Beruf und Konfession in der Schweiz. Olten: Verlag Otto Walter A.-G. 1938. 27 pp.

Buell, Raymond Leslie. Death by Tariff, Protectionism in State and Federal Legislation. Chicago: University of Chicago Press. 1939. iv, 40 pp. 25 cents.

Buros, Oscar Krisen, Editor. Research and Statistical Methodology Books and Reviews, 1933–1938. New Brunswick: Rutgers University Press. 1938. vi, 100 pp. $1.25.

Clark, Colin and Crawford, J. G. The National Income of Australia. Sydney and London: Angus & Robertson, Ltd. 1938. viii, 120 pp. 3/6.

Colcord, Joanna C. Your Community, Its Provision for Health, Education, Safety, and Welfare.

* Annual reports and publications presenting statistics collected at regular intervals have been omitted from this list. Some items of minor interest to statisticians have also been omitted. The contents of periodical publications are not listed, but the attention of the reader is directed to the lists of articles in current publications which are to be found in the *Revue de l'Institut International de Statistique*, *Journal of the Royal Statistical Society*, *American Economic Review*, *Population Index*, *Transactions of the Actuarial Society of America*, *The Record of the American Institute of Actuaries*, and *Sankhyā, The Indian Journal of Statistics*.—Editor.

New York: Russell Sage Foundation. 1939. 249 pp. 85 cents.

COMRIE, L. J. Tables of $\tan^{-1}x$ and $\log(1+x^2)$ to assist in the calculation of the ordinates of a Pearson Type IV curve. Tracts for Computers—No. XXIII, E. S. Pearson, Editor. Cambridge: University Press. London: University College. 1938. 18 pp. 3*s*. 9*d*.

CONSUMER CREDIT INSTITUTE OF AMERICA, INC. Consumer Credit and Its Uses. New York: Prentice-Hall, Inc. 1938. x, 264 pp. $2.75.

DAVIS, JOSEPH S. The World Wheat Situation, 1937–38, A Review of the Crop Year. Stanford University, California: Food Research Institute. December, 1938. Pp. 181–257. $1.25.

DEIST, ADAM. Die Siedlungen der Bergbaulandschaften an der hessisch-thüringischen Grenze. Würzburg: Konrad Triltsch Verlag. 1938. 157 pp. Rm. 4.–.

EASTERBROOK, W. T. Farm Credit in Canada. Chicago: University of Chicago Press. Canada: University of Toronto Press. 1938. viii, 260 pp. $2.50.

FABRICANT, SOLOMON. Capital Consumption and Adjustment. New York: National Bureau of Economic Research. 1938. xx, 271 pp. $2.75.

FEDERATION OF SOCIAL AGENCIES. Foster Family Homes in Allegheny County, March, 1938, by the Committee on Foster Family Care of the Child Welfare Division. Pittsburgh. 1938. 19 pp. 25 cents.

FISHER, R. A. Statistical Methods for Research Workers (Seventh Edition—Revised and Enlarged). Edinburgh and London: Oliver and Boyd, Ltd. 1938. xv, 356 pp. 15/–.

FORD, ROBERT S. Realty Tax Delinquency in Michigan. Ann Arbor: University of Michigan. October, 1937. vi, 125 pp. $1.00.

FRANKEL, S. HERBERT. Capital Investment in Africa, Its Course and Effects. London, New York, Toronto: Oxford University Press. 1938. xvi, 487 pp. $4.00.

FRITZ, MARTIN F. Collection and Presentation of Statistical Data in Psychology and Education. New York: Prentice-Hall, Inc. 1939. vi, 58 pp. 65 cents.

GAYER, ARTHUR D., HOMAN, PAUL T., and JAMES, EARLE K. The Sugar Economy of Puerto Rico. New York: Columbia University Press. 1938. xviii, 326 pp. $3.75.

GRAGG, MABEL TAYLOR. Merchandise Testing as a Guide to Consumer Buying. Boston: Harvard University. November, 1938. v, 84 pp. $1.00.

HURLIN, RALPH G. Statistics of Family Casework Operations, 1937. New York: Russell Sage Foundation. 1938. 31 pp. 25 cents.

KING, WILLFORD I. The Causes of Economic Fluctuations, Possibilities of Anticipation and Control. New York: The Ronald Press Company. 1938. xv, 353 pp. $3.50.

KULP, C. A. Social Insurance Coordination, An Analysis of German and British Organization. New York: Social Science Research Council. 1938. xiv, 333 pp. $2.50.

LABOR RESEARCH ASSOCIATION. Labor Fact Book, Volume IV. New York: International Publishers. 1938. 223 pp. $2.00.

LEAGUE OF NATIONS. Statistics of the Gainfully-Occupied Population. Geneva. 1938. 32 pp. 25 cents.

—— Minimum List of Commodities for International Trade Statistics. Geneva. 1938, 62 pp. 50 cents.

—— Timber Statistics. Geneva. 1938. 17 pp. 20 cents.

—— Statistics Relating to Capital Formation. Geneva. 1938. 22 pp. 25 cents.

LOCKLIN, D. PHILIP. Economics of Transportation (Revised Edition). Chicago: Business Publications, Inc. 1938. x, 863 pp. $4.00.

MCDONALD, DOUGLAS MOORE. A Select Bibliography on the Location of Industry. Montreal, Canada: McGill University. 1937. xi, 84 pp. 60 cents, plus 10 cents postage.

MANLEY, MARIAN. Compiler. The Special Library Profession and What It Offers, Surveys of Fifteen Fields. New York: Special Libraries Association. 1938. $1.00.

MASTELLER, KENNETH C. How to Avoid Financial Tangles. Cambridge, Massachusetts: American Institute for Economic Research. 160 pp. $1.00.

Matolcsy, Matthias and Varga, Stephen. The National Income of Hungary 1924/25–1936/37. London: P. S. King & Son, Ltd. 1938. vii, 116 pp.

Moore, Jane. Cityward Migration, Swedish Data. Chicago: The University of Chicago Press. 1938. xix, 140 pp. $2.00.

National Bureau of Economic Research. Report of the Committee on Prices in the Bituminous Coal Industry, Prepared for the Conference on Price Research. New York. 1938. xx, 144 pp. $1.25.

—— Studies in Income and Wealth, Volume Two, by the Conference on Research in National Income and Wealth. New York. 1938. xii, 331 pp. $3.00.

National Committee for Mental Hygiene, Inc. Research in Mental Hospitals. New York. 1938. viii, 151 pp.

Oxford University. Oxford Economic Papers, Number 1, October 1938. New York: Oxford University Press. 1938. 123 pp. 90 cents.

Pigors, Paul, McKenney, L. C., and Armstrong, T. O. Social Problems in Labor Relations, A Case Book. New York and London: McGraw-Hill Book Company, Inc. 1939. xxiii, 325 pp. $3.00.

Pirou, Gaétan. L'Utilité Marginale de C. Menger a J. B. Clark, Deuxième Édition. Paris: Les Éditions Domat-Montchrestien. 1938. 323 pp. 85 francs.

Priestley, Herbert Ingram. France Overseas, A Study of Modern Imperialism. New York and London: D. Appleton-Century Company, Inc. 1938. ix, 463 pp. $5.00.

Rider, Paul R. An Introduction to Modern Statistical Methods. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Limited. 1939. ix, 220 pp. $2.75.

Riggleman, John R. and Frisbee, Ira N. Business Statistics (Second Edition). New York and London: McGraw-Hill Book Company, Inc. 1938. xix, 790 pp. $4.00.

St. Louis Chamber of Commerce. Tax Payments and State Aid in Missouri by Counties, 1931–1936–1937. St. Louis, Missouri. 1939. 31 pp.

Saulnier, Raymond J. Contemporary Monetary Theory. New York: Columbia University Press. London: P. S. King & Son, Ltd. 1938. 420 pp. $4.00.

Spengler, Joseph J. France Faces Depopulation. Durham, North Carolina: Duke University Press. 1938. xi, 313 pp. $3.00.

Sweezy, Paul M. Monopoly and Competition in the English Coal Trade, 1550–1850. Cambridge: Harvard University Press. 1938. xii, 186 pp. $2.50.

Urlanis, B. C. The History of the United States Census. Moscow. 1938. 311 pp. (Russian Text.)

Watkins, Leonard L. Commecial Banking Reform in the United States. Ann Arbor: Bureau of Business Research, University of Michigan. 1938. 523 pp. $1.00.

Welk, William G. Fascist Economic Policy, An Analysis of Italy's Economic Experiment. Cambridge: Harvard University Press. 1938. xx, 365 pp. $4.00.

Wickizer, V. D. Shipping and Freight Rates in the Overseas Grain Trade. Stanford University, California. Wheat Sudies of the Food Research Institute. October, 1938. Pp. 49–120. $1.00.

Working, Holbrook and Hoos, Sidney. Wheat Futures Prices and Trading at Liverpool since 1886. Stanford University, California: Food Reseach Institute. November, 1938. Pp. 121–80. $1.00.

Government Publications

Department of Agriculture. Relationships among Production and Grade Factors of Beef, by O. G. Hankins and L. B. Burk. Technical Bulletin No. 665. 1938. 40 pp. 10 cents.

—— Agricultural Adjustment Administration. Consumption of Citrus Fruits and Related Products in Baltimore and St. Louis, by George W. Hervey. 1938. 69 pp.

Department of Commerce, Bureau of the Census. Digest of State Laws Relating to Inheritance and Estate Taxes 1938, compiled by Robert H. Holley. 1938. 147 pp. 20 cents.

—— Cotton Production and Distribution, Season of 1937–38, prepared under the supervision of Harvey J. Zimmerman. 1938. 52 pp. 10 cents.

—— BUREAU OF FOREIGN AND DOMESTIC COMMERCE. Store Arrangement Principles, by William H. Meserole and Harry P. Warhurst. 1938. 31 pp. 10 cents.

—— Suggestions for Use in Making a City Survey (Industrial and Commercial), by Ada Lillian Bush. 1938. 56 pp. 10 cents.

—— Retail Credit Survey 1937, by Malcolm L. Merriam. 1938. 153 pp. 20 cents.

DEPARTMENT OF LABOR, BUREAU OF LABOR STATISTICS. Statistics of Building Construction, 1920 to 1937, prepared by Division of Construction and Public Employment. Bulletin No. 650. 1938. 42 pages. 10 cents.

—— Wages in Cotton-Goods Manufacturing, prepared by A. F. Hinrichs Bulletin No. 663. 1938. 154 pp. 20 cents.

—— WOMEN'S BUREAU. The Effect of Minimum-Wage Determinations in Service Industries. Bulletin No. 166. 1938. 44 pp. 10 cents.

—— Industrial Injuries to Women and Men, 1932 to 1934, by Margaret T. Mettert. Bulletin No. 160. 1938. 37 pp. 10 cents.

SECURITIES AND EXCHANGE COMMISSION. Investment Trusts and Investment Companies. Part Two: Statistical Survey of Investment Trusts and Investment Companies. Volume III, Chapter V: Ownership and Control of Investment Trusts and Investment Companies. 1938. 91 pp. (Mimeographed.)

—— Selected Information on Steel Producers with Assets Over $100,000,000 Each, Registered under the Securities Exchange Act of 1934 at June 30, 1938. 1938. 63 pp.

—— Selected Information on Meat Packers with Assets Over $50,000,000 Each, Registered under the Securities Exchange Act of 1934 at June 30, 1938. 1939. 45 pp.

SOCIAL SECURITY BOARD, BUREAU OF RESEARCH AND STATISTICS. Tabular Summary of Statistics of Public Assistance Under the Social Security Act for the Calendar Year 1937. 1938. 52 pp. 15 cents.

UNITED STATES TARIFF COMMISSION. Cutlery Products. Report No. 129 Second Series. 1938. 82 pp. 15 cents.

—— The Mica Industry. Report No. 130 Second Series. 1938. 155 pp. 25 cents.

—— Synthetic Resins and Their Raw Materials. Report No. 131 Second Series. 1938. 162 pp. 25 cents.

—— Dyes and Other Synthetic Organic Chemicals in the United States, 1937. Report No. 132 Second Series. 1938. 57 pp. 10 cents.

WORKS PROGRESS ADMINISTRATION. Seasonal Employment in Agriculture, by Benjamin J. Free. 1938. 58 pp.

—— Report on Progress of the WPA Program, June 30, 1938. 1938. 147 pp.

—— NATIONAL RESEARCH PROJECT. Productivity and Employment in Selected Industries: Beet Sugar, by Raymond K. Adamson and Miriam E. West. 1938. 190 pp.

—— Phosphate-Rock Mining, 1880–1937, by A. Porter Haskell, Jr., and O. E. Kiessling. 1938. 130 pp.

—— Industrial Instruments and Changing Technology, by George Perazich, Herbert Schimmel, and Benjamin Rosenberg. 1938. 148 pp.

—— Trends in Employment in Agriculture 1909–36, by Eldon E. Shaw and John A. Hopkins. 1938. 163 pp.

—— DIVISION OF SOCIAL RESEARCH. Urban Housing, A Summary of Real Property Inventories Conducted as Work Projects, 1934–1936, by Peyton Stapp. 1938. 326 pp.

—— Rural Youth: Their Situation and Prospects, by Bruce L. Melvin and Elna N. Smith. 1938. 167 pp.

—— Age of WPA Workers, by R. Nassimbene, November, 1937. 1938. 20 pp.

—— Workers Separated from WPA Employment in Nine Areas, 1937, by Veri E. Roberts. 1938. 22 pp.

WISCONSIN TAX COMMISSION. Wisconsin Individual Income Tax Statistics: 1936 Income, Volume I, Tax Analysis. Madison. 1938. 149 pp.

ARGENTINA. Cuarto Censo General 1936 Poblacion. Buenos Aires: Municipalidad de la Ciudad de Buenos Aires. 1938. 430 pp.